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Greaves (1602-52), professor of geometry and
Orientalists of his day, a great traveller and
of mathematics, friend of Briggs, Bainbridge,
highly commended by Edward Bernard. Hazli

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foot, and denarius...the measures and

..With folding plate. London: M.F. for



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astronomy, one of the most learned
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A
DISCOVRSE
OF THE
ROMANE FOOT,
AND
DENARIVS:

From whence, as from two principles,
THE MEASVRES,
AND
WEIGHTS,
used by the Ancients, may be deduced.

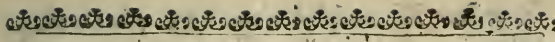
By IOHN GREAVES, *Professor of Astronomy
in the Vniversity of Oxford.*

Σπεδιαστέον ὅπως δειδῶσι καλῶς αἱ ἀρχαί. μετὰ τὴν γὰρ
ἔχουσι ῥοπήν πρὸς ἐπὶ τὴν αἰ.

L O N D O N,
Printed by M. F. for William Lee, and are to be
sold at his shop at the sign of the Turks head .
in Fleet-street: 1647.

*Una fides, pondus, mensura, moneta sit una,
Et status illesus totius Orbis erit.*

Budellius de monetis.


 To his truly noble, & learned friend,
John Selden Esquire, Burgesse of the
 University of *Oxford* in the Honoura-
 ble House of Commons.

SIR,



*That I should present You, who have
 so honourably deserved of Anti-
 quity, and of Your Country, and, if
 I may add mine own obligations, in
 particular of me, with so small a
 retribution, as a Romane foot, &*

*Denarius, may seem more proportionable to mine a-
 bilities, then to the eminency of Your place, and
 Worth. But You who, to the honour of Your profes-
 sion, have joined the wisdom of the Ancients, and
 justly have merited this elegy,*

——— *Anglorum gloria gentis*
Seldenus,

*An elegy long since given You by a man, who is
 deservedly esteemed πολλῶν ἀντιέξιος ἄλλων, the lear-
 ned Hugo Grotius, You are best able to judge of
 what importance these two are, in the discovery of
 the Weights, and measures, used by the Ancients.*

*And first, for measures, the ΠΩΝ, or cubit of
 the Sanctuary, in the Scriptures, Josephus, and the
 Rabbines: the Αἰγυπτίῳ and Βαβυλώνιος πῆχυς in
 Herodotus (the former equall to that of Samos:
 the later mis-rendred by Pliny, & Solinus, Pes Ba-
 bylonius): The περασίτης Περσικὸς in Herodotus,
 containing XXX. στάλια, in Strabo, sometimes LX.*

sometimes XL. and sometimes XXX. (but in Hesychius ὁ παραστάτης ἔχει μίλια τέτταρα, and in Abulfeda three miles: with whom, and with

the Persians to this day it is called the فرسخ

الفارسى الفرسى (the ῥοῖν Αἰγυπτίῳ in Herodotus, Artemidorus, and Strabo: the πῦς βαπλικός, καὶ φιλε-παίρει in Hero: the pes Ptolemaicus, and Dru-

الساق الفرسى sianus, in Hyginus: besides infinite others depen-

عند ding upon the proportions of some of these: I say,

الانسان الذين these cannot after the destruction of those ancient

ثلاثة restored, then from such monuments, as, by divine

الاصبع providence, have escaped the hands of ruine, and

الاصبع continued to these later ages. For Were it not that

the pes Romanus, or Monetalis, as Hyginus terms

it, were still extant in Rome, on the monuments of

Cossutius, and of Tit. Statilius Vol. Aper (for those

two columnes, the one with the inscription ΠΟΔ. Θ.

mentioned by Marlianus, and Philander: the other

with ΠΟΔ. ΙΒ. seen by the same Philander, are both

lost) we might utterly despair of knowing the mea-

sures of the Hebrews, Babylonians, Persians, Æ-

gyptians, Grecians, Romanes, and of all others, de-

scribed in Classicall Authors: who could not trans-

mit to posterity the individuall measures them-

selves, but onely the proportions they respectively

had to one another: which proportions being pure

habitudes, cannot, as Mathematicians observe, be

reduced to the measures of these times, unlesse,

either some of the ἀρχαῖα themselves were ex-

istent: or else exact copies taken from the Origi-

nals were derived to us.

In like manner it is for weights, the סבב, the

כרז,

The farsach, with the Ancients, and Moderns, contains three miles.

Abulf. Geogr. M5.

ככר, the שֶׁקֶל, or δίκλα of the Hebrews, or נֶשֶׁלֶס of the Chaldeans, which Aruck renders by foure זוזי Zuzim, that is, four denarii (from whence, tho Persian δίκλα in Xenophon, and Hesychius, may have received its denomination) : the τάλαντον βαβυλώνιον, containing seven thousand Attick drachmes, the τάλαντον Αιγυπτιακόν ten thousand, the τάλαντον Σύρον a thousand five hundred, the τάλαντον Ἀττικόν six thousand, all mentioned by Julius Pollux ; the Talentum Ægyptium in Varro, containing eighty pondo, or pounds ; the talentū Euboicum in Festus, four thousand denarii : these, with infinite others, both mensuræ, and pondera, whither considered as Medica, or Georgica, or Veterinaria, cannot in our times be restored, but onely by such weights of the Antients as are still extant ; that is, either by the denarius of the Romanes, or δειγμα of the Grecians, or by the congius of Vespasian, or by the libræ, and uncia Romana, and the like, that have been preserved by Antiquaries.

Seeing therefore the denarius is of as great moment for the discovery of weights, as the Romane foot for the knowledge of measures, I have taken these two, as two irrefragable principles, from whence the rest used by the Ancients may be deduced. And because the denarius may be considered in a double respect, either as nummus, or as pondus : the first acception conducing to the valuation of coins, the second to the certainty of weights : it was therefore necessary that both the weight, and valuation of the denarius, should be exactly known. To which purpose, in Italy I examined with a balance (the scale of which the eightieth part of a grain would sensibly turn) many hundred fair denarii,
both

both Consulares, and Cæsarei, as also quinarîi; or victoriati in silver: severall aurei of the former, and later Emperours: besides the originall standard of the congius, placed by Vespasian in the Capitol: and many uncia, and libra, in brasse. From whence I collected the weight of the denarius Consularis, and Cæsareus: that to be the seventh part of the Roman ounce, as Celsus, Scribonius Largus, and Pliny rightly describe: and this to be sometimes the eighth part, and sometimes the seventh, but most frequently in a middle proportion betwixt eight, and seven, till Severus', and Gordianus' times: under whom, and the succeeding Emperours, it recovered the weight of the denarius Consularis; but lost much of its finenesse, by the mixture of allay.

With these denarii, for the greater certainty, I compared such Greecian coins (especially Athenian) as I had either seen in choice cabinets, or bought of mine own; and those were the χρυσῖ, or σαρῖpes absolutely taken, which, as Julius Pollux, and Hesychius, out of Polemarchus testifie, weighed two drachmes: the τετραδραχμα, or ~~τετραδραχμα~~, or σαρῖpes ἀπυρῖς, four drachmes: the δραχμαῖ, the τετρωβολα, or as Pollux names them, the ἡμιδραχμα, with severall others.

By which comparison I first discovered, that howsoever the Romanes, as Pliny, and A. Gellius expressly; Valerius, and Suetonius, by way of consequence, equall the denarius to the drachma: and though the Greeks, as Strabo, Cleopatra, Plutarch, Galen, Dio, and many more, equall the drachma to the denarius, speaking in a popular estimation, and as they vulgarly passed in way of commerce; yet if we shall put on the resolution of him in the Comedy,

Ocul-

Oculatæ nostræ sunt manus, credunt quod vident :

we may evidently discern in the scale, the drachma Attica to be heavier then the denarius. And therefore all such writers of the Ancients, as equall them, if we speak strictly of weight, and not of estimation, have been deceived: and consequently, all modern writers, following their traditions, in discourses de ponderibus, & de re nummariâ, have erred.

But because it is not probable, that the Ancients, both Greeks, and Romanes, should be deceived in their own coins, and in their own times: it occasioned me by observing the practise abroad of the κομμιστὰι in exchanges, with whom the same specificall coins, in different States, passe with different estimations, to think of some means how I might reconcile the traditions of the Greeks, and Romanes, concerning the weight, and valuation of the drachma Attica, and denarius; notwithstanding the difference in the balance, of such as are now found at Athens, and at Rome.

And this drew from me that discourse, which I have inserted at the end of this booke, Of some directions to be observed in comparing the valuations of coins: which may serve, not onely to reconcile the Greek, and Romane writers, but especially, the traditions of Philo, Josephus, Epiphanius, Saint Hierome, and Hesychius: who make the Hebrew שֶׁקֶל shekel; equall to the Attick tetradrachme: whereas in the scale, which is the best judge of this controversie, I finde them manifestly unequall: the Hebrew, or Samaritane shekel, being much lesse then the Attick tetradrachme.

But it may be questioned, Why after the labours of Portius, Budæus, Alciatus, Agricola, Montanus, Mariana, Budelius, Alcasar, Villalpandus, Jo: Scaliger, Capellus, Snellius, and of many other eminent men, who have writ, either deditâ operâ, or ἐν πᾶσι, de ponderibus, & mensuris, I should undertake any thing of this nature. My answer is, that observing in them so great a variety, and contradiction of opinions, I was willing to use mine own judgement, how mean soever, in giving my self private satisfaction. And though I intended this work, as ἀπαρρητοῦ to other imployments; yet having, by the advantage of travailling in forain parts, perused in Italy, Greece, and Ægypt; more Antiquities, then I think any of them above named single, I thought it would not be unacceptable, if I did, as it is the manner of Travellers, publish at home, such observations, and discoveries, as I made abroad. The which I humbly dedicate to You, as out of a desire to expresse my gratitude for many noble favours: so out of an assurance, that if they receive Your approbation, I need not to fear the censure of others.

Your most obliged friend,

and humble servant,

John Greaves,

OF THE ROMANE FOOT.



That the foot was the most received, and usuall measure amongst the Romans, as the cubit amongst the Jews, is a thing not controverted by any. For ^a Polybius de-

^a Polyb. li. 6.

scribing their *Scutū*, makes it in breadth over the bend two [Romane] feet and an half, and in length four feet: or, if it be of a greater sort, a palme more is to be added to this measure. And not

long after expressing the manner of their castrametation, or encamping, he ^{*} writes; that as often as a place is designed for the camp, the *Prætorium* (or Generals lodging) takes up that part, which is fittest for prospect, and direction. Setting therefore up the Standard, where they intend to fix the *Prætorium*, they so measure out a square about the Standard, that each side may be distant from it an hundred feet, and the whole area contain foure

^{*} Polyb. *ibid.*
τεθesis δὲ τὴ
σημαίας, ἧ
μέλλουσιν ἀπο-
μετρεῖται
πέρι τὴν σημαί-
αν τετραγώνου
τόπου, ὡς τε
πάσης τῆς
πλευρᾶς ἕκα-
τον ἀπέχεν
πόδας τὴν ση-
μαίας, &c.

jugera. In like manner ^b Caesar, in the description of his bridge over the Rhine, makes the binders, or transversary beames, to be *bipedales*.

^b Cæsar. Comm. lib. 4.

^c Tully also judges the quantity of the apparent diameter of the Sun to be *pedalis*. And not to

^c Cicero l. 2. Academ. quæst.

produce more Authorities, ^d Suetonius relates, that Augustus presented before the people of Rome

^d Suetonius in Augusto,

*Adolescentulū
Lucium honestē
natum exhibuit,
tantū ut o-
stenderet, quōd
erat bipedali
minor, librarum
xvii. ac vocis
immense.*

Lucius a young Gentleman, well descended, onely for to shew that he was lesse then two feet in height, seventeen pounds in weight, and of an immense voice. But concerning the precise quantity of this foot, there is not any one thing after which learned men have more inquired, or in which they doe lesse agree. For *Budeus* equals it to the *Paris* foot; *Latinus Latinus*, *Maffaus*, *Vrsinus*, and others, deduce it from an ancient monument in the Vatican of *T. Statilius Vol. Aper: Portius Vicentinus*, *Philander*, *Georgius Agricola*, *Ghetaldus*, *Donatus*, and severall others, contend the foot on *Cossutius* monument in *Rome*, to be the true Romane foot: *Marlianus* describes it out of a *Porphyry* columnne, with this inscription ΠΟΔ. Θ: *Lucas Patus* defines it from some brasse feet found amongst the *rudera* in *Rome*: *Villalpandus* derives it from the measure of the *Congius*, placed by *Vespasian* in the *Capitol* (the originall Standard being still extant): *Willebrordus Snellius* equals it to the *pes Rhinlandicus*: and severall others have had severall fancies, and conjectures. In such a variety, and uncertainty of opinions, we have no more solid foundation of our inquiry, then either to have recourse to the writings of the Ancients; or else to such other monuments of Antiquity, as having escaped the injury, and calamity of time, have continued intire to this present age.

• *Vitruvius* l. 3.

And first for the Ancients. • *Vitruvius* in his third book of Architecture, gives this description of the Romane foot: *E cubito cū dempti sunt palmi duo, relinquitur pes quatuor palmarum. Palmus autem habet quatuor digitos, ita efficitur*

uti pes habeat XVI. digitos, & totidem asses areos denarius. ^f *Columella* shews that it was the basis, and foundation to all their other measures: *Modus omnis area pedali mensurâ comprehenditur, qui digitorum est XVI. Pes multiplicatus in passus, & ætus, & climata, & jugera, & stadia, centuriasque, mox etiam in majora spatia procedit.* *Passus pedes habet V.* & *Frontinus* more clearly, and distinctly expresseth the severall parts, and divisions of it. *Pes habet palmos IV. uncias XII. digitos XVI. Palmus habet digitos IV. uncias III. Sextans, quæ eadem dodrans appellatur, habet palmos III. uncias IX. digitos XII.* From which Authority of *Frontinus*, and the place before cited of *Vitruvius*, we may collect some analogy to have been observed in the proportions of the Romane foot, and of the Romane coins. For as the *denarius* contained *XVI. asses*, so the foot contained *XVI. digitos*: And as the *assis* was divided in *XII. uncias*, so likewise the foot was divided in *XII. uncias*; and therefore the *dodrans* is used by *Frontinus*, and the *semuncia*, and *scilicus* by *Pliny*, for proportionable parts of the Romane foot; as the same are used by other Classicall Authors for proportionable parts of the Romane *assis*, and *uncia*. From which analogy, the *pes Romanus*, I suppose is teamed by * *Hyginus pes monetælis*. Likewise in the ancient Laws of the *XII. Tables* (which *Tully* calls the fountains of the Civill Law) the *sestertius pes* hath the same proportion with the *sestertius incoines*; For as the *sestertius* according to *Arruntius*, was *olim dupondius & semis*, anciently two pounds of brasse and an half; ^{*} *Hygin. de lib. mit. constit.* ^{*} *Arruntius ex editione Gotofredi.*

* Vol. Met: de
assis distri.

so the *sestertius pes* was two feet and an halfe.

* *Volusius Matianus*, « *Sestertius duos asses &*
« *semissem, quasi semis tertius; Græca figura*
« *ἑξάδραμον ἡμιτάλαντον. Nam sex talenta & se-*
« *mitalentum eo verbo significantur. Lex eti-*
« *am XII. Tabularum argumento est, in qua duo*
« *pedes & semissis, sestertius pes vocatur. But*
to return to *Frontinus*, who farther discour-
sing of the Romane foot, gives a distinction
of three sorts of feet: and those were
first, *pes porrectus*, next, *pes constratus*, or as^h *A-*
gricola reades it, *contractus*, and lastly, *pes*
quadratus. The first was the measure of longi-
tudes, the other two of superficies. There
were, writes * *Frontinus*, *In pede porrecto semi-*
pedes duo, in pede constrato semipedes quatuor,
in pede quadrato semipedes octo. Which words
of his are to be thus explicated; the *pes por-*
rectus, was the Romane foot extended in
length, and therefore there were in it *semi-*
pedes duo: The *pes constratus*, was the square of
the *semipes*, and therefore the perimeter of it
contained *semipedes quatuor*, or, which is all
one, two intire Romane feet: The *pes quadra-*
tus, was the square of the Romane foot; where-
fore of necessity there must bee foure feet
in the perimeter, or in *Frontinus'* expression,
eight *semipedes*. The sameⁱ Author likewise in
his book *de aquæductibus*, describing the digit, &
uncia of this, (*Est autem digitus, (saies he) ut*
convenit, sexta decima pars pedis, uncia duo-
decima) useth a distinction of digits, as hee did
of feet before, not mentioned by any other Au-
thor: *Quemadmodum autem inter unciam, & di-*

^h *Agricola de*
mensuris qui-
bus intervalla
metimur.

* *Frontinus de*
limitibus agro-
rum.

ⁱ *Frontinus de*
aquæductibus.

gitum

gitum diversitas, ita & ipsius digiti simplex observatio non est. nam alius vocatur quadratus, alius rotundus. Quadratus tribus quartis decimis suis rotundo major: rotundus tribus undecimis suis quadrato minor est. The proportions here assigned by him to the *digitus quadratus*, and *rotundus*, are the same, which ¹ Archimedes long before used: and those are, that a circle hath the same proportion to the square of the diameter, that $\overline{\text{XI}}$. hath to $\overline{\text{XIV}}$. Hero also, discoursing of severall sorts of measures, informs us thus concerning the foot: 'Ο μὲν δακτύλος, μέτρον ἔστι σμικρότατον. ἡ δὲ δοχμὴ ἔστι δακτύλων δ', ὅπερ μέτρον καὶ δακτυλοδόχμη παλαιή τε καὶ δῶρον καλεῖται. ἡ δὲ λιχάς ἔστι δακτύλων ι', τὸ δ' ὀρθόδωρον ια', ἡ δὲ σπιδαμὴ ιβ', ὁ δὲ πῦς δόχμων δ', ἡτοι δακτύλων ις', ἡ δὲ πυγμὴ δακτύλων ιη', ὁ δὲ πυγὼν κ', ὁ δὲ πῆχυς κδ', ἡτοι δοχμῶν ε', ἡ δὲ ὀργυιὰ πήχεων δ', ἡτοι ποδῶν ε', the digit is the least measure, the palm consists of $\overline{\text{IV}}$. digits, and is called *dactylodochme*, and *palaiſte*, and *doron*. The *lichas* is tenne digits, the *orthodoron* eleven: The *span* $\overline{\text{XII}}$. The foot hath $\overline{\text{IV}}$. palmes, or $\overline{\text{XVI}}$. digits the *pygme* $\overline{\text{XVIII}}$. digits. The *pygon* $\overline{\text{XX}}$. The *cubit* $\overline{\text{XXIV}}$. or $\overline{\text{VI}}$. palms the *orgyia* $\overline{\text{IV}}$. cubits, or $\overline{\text{VI}}$. feet. Most of which measures the Romanes borrowed from the Greeks; as on the contrary the Greeks borrowed the *ἰσμετρον*, and *μῖλιον*, from the Romane *jugerum*, and *milliare*. The same Hero describes another sort of foot used in Italy. 'Ο δὲ Ἰταλικὸς πῦς δακτύλος ἔχει τρεῖς καὶ δέκα καὶ τρίτον. The Italian foot contains thirteen digits, and one third, Whence ^m Salmasius concludes, that the Romanes used

¹ Archim. de
circ: dimens.
prop. 2.

^m Salmasii Exercit. Plinian. c.
p. 684.

one sort of foot in *Rome*, consisting of $\overline{\text{XVI}}$. digits, and in some parts of *Italy* another being but $\overline{\text{XIII}}$. digits, and one third. Which might be granted, did not ⁿ *Hyginus*, who is much antienter, in his tract *de limitibus constituendis*, contradict it. His words are these: *Item dicitur in Germaniâ in Tungris pes Drusianus, qui habet monetalem, & fescunciam, ita ut ubicunque extra fines, legesque Romanorum, id est, ut sollicitius proferam, ubicunque extra Italiam aliquid agitatur inquirendum; & de hac ipsâ conditione diligenter præmoneo, ne quid sit, quod præteruisse videamur.* Where speaking immediately before of the *pes Romanus*, or as he also calls it, the *pes monetalis*, by which he measures and defines the *limites*, he gives us this caution, that out of *Italy* (for in *Italy* he supposes one measure to be generally received) we are to observe the quantity of the foot, or measure of the Country. And for this reason, to avoid ambiguity, he assigns the proportions of the *pes Drusianus*, at *Tongerem* in *Germany*, to be a *fescuncia* more then the *pes monetalis* used at *Rome*, and in *Italy*. And so in another part about *Cyrene*, which *Ptolemy* gave to the Romanes. ^o *Pes eorum qui Ptolemaicus appellatur habet monetalem pedem, & semunciam.* But to omit the *pes Ptolemaicus* (For our inquiry is onely of the Romane foot.) I cannot but wonder at the mistake of ^{*} *Joseph Scaliger*, concerning the *pes Drusianus*, and *Romanus*, who thus writes. *Pes igitur ille Drusianus major est Romano fescunciâ. fuit enim $\overline{\text{XXII}}$. digitorum, quætorum $\overline{\text{XVI}}$. est pes Romanus.* If it were but a

ⁿ *Hyginus de limitibus constituendis*:

^o *Hyginus ibid.*

^{*} *Ios: Scaliger de re nummaria*

fescuncia

fescuncia, greater then the Romane foot, as *Hyginus*, and he also make it, how can it possibly be *XXII. digitorum*? or how can he excuse his words, which immediately follow? *Ex quo colligimus pedem Drusianum omnino esse eum, qui hodie in Galliâ, & Belgio in usu est, qui profectò major est VI. digitis, quantorum XVI. est pes, qui Roma in hortis Angeli Colotii sculptus in saxo visitur. Eum enim nos cum pede Gallicano comparantes, id verissimum esse deprehendimus.* Neither is the error of some others much lesse, in making the *pes monetalis*, or *Romanus*, and *pes Regius Philetarius*, to be equall. Because the Romane foot consisted of *XVI.* digits, as *Frontinus* writes, and the *pes Philetarius* of as many, as *P Herò* shews: *ὁ ποὺς ὁ μὲν βασιλικὸς, καὶ φιλεταίριος ὁ λεγόμενος ἔχει παλαιστὰς δ', διακτύλους ις'.* *P Heroin Isa-*
goge. there-
 fore both these are equall. The error is in supposing all digits to be alike; and therefore the same number of digits being in both, that both are equall. By the same argument we may conclude the Romane foot, and Arabian foot, and the *derah*, or cubit of these, to be equall to the cubit, or *sesquipes* of the Romanes: seeing *A-Abulfeda Geo-*
bulfeda, an Arabian Geographer, defines the *derah* to consist of *XXIV.* digits, and so many also did the Romane *sesquipes* contain. But the observation of *Rhemnius Fannius* in this particular is much better; which he applies to weights, *Rhemnii Fannii fragmentū.*
 and we may by analogy assign to measures.

*Semina sex alii siliquis latitantia curvis
 Attribuunt scripulo, lentes veraciter octo,
 Aut totidem speltas numerant, tristésve lupinos
 Bis duo; sed si par generatim his pondus inesset,*

Servarent eadem diversa pondera gentes :

*Nunc variant. Etenim cuncta non fœdere certo
Natura, sed lege valent, hominûmque repertis.*

*Isid. Hispal.
l. 15. c. 15.*

But to return to the Romane foot. Laltly, we may alleage *Isidorus Hispalensis. Palmus autem, quatuor habet digitos, pes XVI. digitos, Passus pedes quinque, Pertica passus duos, id est decem pedes.* And this is that which I finde delivered by such of the Ancients, as are extant. Out of which bare, and naked descriptions, it is as impossible to recover the Romane foot, as it is for Mathematicians, to take either the distance, or altitude of places, by the proportions of triangles alone, or by Tables of Sines, and Tangents, without having some certain and positive measure given, which must be the foundation of their inquiry. All that can be collected by these descriptions, is this, that wee may know into how many parts the Romanes usually divided their feet; and all these divisions I have seen in some ancient ones. But suppose there were no Romane foot extant; how by XVI. digits, or by IV. palms, or by XII. *uncia*, (which is the most uncertain of all; seeing whatsoever hath quantity, how great or small soever it is, may be divided in XII. *uncias*) could it be precisely restored? For if that of * *Protagoras* be true, as well in measures, as in intellectuall notions, that man is *πάντων χρημάτων μέτρον*: Whence *Vitruvius* observes, that the Latines denominated most of their measures, as *their digit, palm, foot, and cubit*, from the parts and members of a man: who shall bee that perfect and square man, from whom we may take a pattern of these measures?

** Protagoras apud Aristot. l. 13. cap. 5. Metaphys. πέντων ἑναι χρῆματων μέτρον ἔστιν τὸ ἀνθρώπου.*

"Nec minus mēsurarum rationes, quæ in omnibus videntur necessariæ esse, ex corporis membris colligerunt: uti digitum, palmum, pedem, cubitum. Vitruv. l. 3 c. 1.

or

or if there be any such, how shall we know him? or how shall we be certain the Ancients ever made choice of any such? Unlesse, as some fancy, that the cubit of the Sanctuary, was taken from the cubit of *Adam*, he being created in an excellent state of perfection: So we shall imagine these digits, and palms, to have been taken from some particular man of completer lineaments then others. On the other side, if this foot may be restored by the digits, and palms of any man at pleasure, since there is such a difference in the proportions of men, that it is as difficult to finde two of the same dimensions, as two that have the same likenesse of faces, how will it be possible, out of such a diversity, to produce a certain and positive measure, consisting in an indivisibility, not as a point doth in respect of parts, but in an indivisibility of application, as all originals, and standards should doe? The *Arabians*, to avoid this difficulty, shew us a more certain way, as they suppose, how to make this commensurall digit, and consequently the foot: and that is by the breadth of six barley corns laid one contiguous to another. For thus * *Muhammed Ibn Mesoud* in his book, intituled in Persian *gehandanish*, relates; that in the time of *Almamoun* (the learned Calife of *Babylon*) by the elevation of the pole of the equator, they measured the quantity of a degree upon the globe of the earth, and found it to be fifty six miles, and two thirds of a mile: every mile containing four thousand cubits, and each cubit twenty four digits, and every digit six barley corns. The same proportions are assigned in the *Geographia*

مسود
ابن
موسى
MS.

phia Nubiensis, printed in Arabick at Rome :

الذراع اربعة وعشرون اصبعاً والاصبع
ست حبات شعير *The cubit is twenty four*

digits, and every digit is six barley corns. But this is as uncertain as the former, and is built upon a supposition, that all such are of the same dimension. Whereas those of one Country differ much from those of another; and those of the same Country (as I have made triall in *Egypt*, more out of curiosity, then as hoping this way to give my self satisfaction) are not all of the same bignesse: and not onely so, but in the self same ear, there is a sensible difference, as experience doth shew. And yet *Snellius*, a man much to be commended for his abilities in the Mathematicks, and to be blamed for his supine negligence, both in his measure of the magnitude of the earth, and in his dimensions of the Ro-

¹ *Snellius in E-ratosth. Batav. lib. 2. cap. 2.*

² *Aly Kufsh-gy, who assisted Plug Beg in compiling his Astronomical Tables in Persian (Tables*

the most exact of any in the East) limits their breadth by vii. hairs of an horse.

هر اصبع مقدار شش جو معتدل و عرض هر جو

مقدار شش تاره موي بال اسب *Every digit is six barley*

corns laid evenly together, and the breadth of every barley corn is six haire of an horses taile. Instic: Astron; Aly Cushgy, MS.

swerable

swerable to the Romane *sesquipes*, or cubit, shall consist of twenty four digits, and every digit of sixe barley corns, and every barley corn of six hairs of a camell. So that in conclusion the hair of a camell, shall be the *minimum* in respect of measures. But this invention however at the first it may seem somewhat subtile (for we are come now almost as low as atomes) is least of all to be approved. For though the supposition were true that all hairs are of a like bignesse in all camels, whereas they are different in one and the same; yet this objection is unanswerable, that seeing hairs are not perfectly round, though the the sense judges them so, but angular, and that with some inequality, as magnifying glasses plainly demonstrate, it will be very difficult so to size them together, that they shall always take up the same breadth: and if they do not, little errors committed in such small bodies, though at the first insensible, will infinitely increase, and multiply, in the measuring of great distances, to which these are supposed the foundation. And therefore I cannot but approve the counsell of ^b *Villalpandus*, who adviseth such as will examine measures and weights, to begin with the greater, and not with the lesser. And that there is reason for his assertion, may be made evident, especially in weights, to such as shall make an experiment. For admit there were a Standard of ten thousand grains, and another of one grain, it will be easie, by a continued subdivision of the former, with a good balance, to produce a weight equall to the standard of one grain: yea, though at the beginning,

^b *Villalpandus*
de apparatu
Vrbis ac Templi
par. 2. l. 3. c. 25.
Atque in uni-
versum illud
unum monitos
velim eos om-
nes, qui mensu-
rarum ac pon-
derum cognos-
cendorum desi-
derio tenetur, ne
à minimis inci-
pant exarsina-
re majora: non
vel minimus
quisque error
sepius multi-
plicatus in
magnum addu-
cit errorum
cumulum.

ning, some little errour had been committed, which after many divisions will vanish, and become imperceptible. Whereas on the contrary, the most curious man alive, with the exactest scale that the industry of the most skilfull artizan can invent, shall never be able out of the standard of one grain, to produce a weight equall to the weight of ten thousand grains, but that there shall be a sensible, and apparent difference; yea, though he had that excellent scale mentioned by ^c *Capellus* at *Sedan*, which would sensibly be turned with the $\overline{\text{IV}}$. hundreth part of a grain. The like difference as we find in weights, we may conceive by analogy to be in measures, when they shall be made out of such litle parts, as hairs, barley corns, digits, and the like. And therefore I cannot but disapprove the ordinary course of most Geographers, whither Greeks, Latines, or Arabians, that from such nice beginnings, measure out a degree upon earth, and consequently the magnitude of this globe. On the contrary the enterprize of ^d *Snellius* in his *Erato-*
sthenes Batavus, and of our Countryman ^e *M.*
Wright, hath been more commendable: who by the space of a degree on earth, (or which were better of many degrees) have endeavoured to fixe measures, with more exactnesse, and certainty for posterity. But of this argument I shall have occasion to speak hereafter. And therefore to return to the businesse in hand.

Since the Romane foot cannot be recovered by hairs, grains, digits, palms, and such like physical bodies, which being of a various, and indeterminate magnitude, cannot give, unlesse by

^c *Capellus de pond. & nummis lib. 1.*

^d *Snell: in Eratosth: Bat. lib. 2.*
^e *Wright, of the errours of Navigation.*

accident, the commensuration of that which ought to be precisely limited, and determined: some relinquishing the former way as erroneous, have endeavoured, with much ingeniousness, by weights, to find out the Roman foot. For there is the same analogy between measures and weights, as between continued, and discrete quantities: And as Mathematicians by numbers demonstrate, or rather illustrate the affections of lines, superficies, and Geometricall bodies: so by weights, measuring some physicall bodies, especially such as are liquid, in cubicall vessels, (which are easiest commensurable) we may render the exact quantity of the Romane foot, and by consequence of all their other measures. And therefore *Lucas Patus*, and *Villalpandus*, have attempted with probable reasons to discover the Romane foot, the one by the *Sextarius*, the other by the Romane *Congius*. For the *Sextarius* being the sixth part of the *Congius*, and the *Congius* containing X. *librae*, or pounds, as it is manifest by that exquisite standard in *Rome*, with this inscription.

^f *Luc. Patus*
li. 3. de mensur.
& pond: Rom.
^g *Villalpandus*
de appar. Urbis
ac Templi. par:
2. l. 3. cap. 25.

IMP. CÆSARE

VESPAS. VI

T. CÆS. AUG. F. IIII^{COS}

MENSURÆ

EXACTÆ IN

CAPITOLIO

P X

P X signifies
Pondo decem.

^h *Fragmenta
Dioscoridis.*

ⁱ *Sext. Pomp:
Festus de Verb:
signif.*

^k *Rhemn: Fann:
fragment.*

Again the *Congius* being the eighth part of the *amphora*, or *quadrantal*, filled with water or wine, as by the testimonies of ^h *Dioscorides*, ⁱ *Sext: Pompeius*, and of an ancient Anonymus Greek Authour translated by *Alciat*, it doth appear: if therefore a Vessell be made of a cubicall figure, which may receive *VIII. congi*, or *XLVIII. sextarii*, or *LXXXIIII.* pounds of water or of wine, out of the sides of this cube, by ^k *Rhemnius Fannius* his description, or rather by *Sextus Pompeius*, who is ancients, will the Romane foot be deduced. For both these write (neither is it as yet contradicted by any man) that the longitude of one of the sides of the *amphora* (being a cube) is answerable to the Romane foot. And here our inquiry would be at an end (supposing the Authorities of *Festus*, and *Fannius* to be unquestionable) were there not farther some objections, which cannot easily be removed. And those are first, a supposition that we have the true Roman *libra* (for by this we are to finde the *Congius*, admitting there were none extant, as by the *Congius*, the *amphora*, or *quadrantal*): a thing of as great difficulty as the foot it self. And besides, if this were obtained, yet we cannot have an absolute certainty, that water, or wine, shall in all places alike ponderate; by reason of the different gravity, which is observed in naturall bodies, though they be homogeneous, and of a like substance. Wherefore laying aside all such speculations, as being farre from that accuratenesse, which is required, there is no other possible means left for this discovery, but to have recourse to such monuments of Antiquity,

tiquity, as have escaped the injury, and calamity of time, which is our next, and second inquiry.

And here it will not be amiss to see what learned men, who not long preceded our age, have observed out of ancient monuments, concerning the Romane foot: and then to relate what course I took to give my self private satisfaction, which, I hope, will be also satisfactory to others. *Philander* in his *Commentaries upon Vitruvius*, being one of the first that had seen, and diligently perused many ancient measures in *Rome* (whereas *Portius*, *Agricola*, *Glareanus*, and some others, received them upon trust) gives us so much the more certain information. His words are these: ¹ *Veruntamen quoniam non statim ex cujuscunque pollicibus, aut digitis, quis fuerit apud antiquos Romanus pes sciri potest, facturum me studiosis rem gratam putavi, si ad marginem libri semipedem apponerem, dimensum ex antiquo pede, in marmore, quod est in hortis Angeli Colotii Romæ sculpto, cujus etiam, nisi me fallit memoria, meminit Leonardus Porcius lib. de Sestertio. Eum enim pedem, nos ceteris qui circumferuntur, prætulimus, quod conveniret cum eo, quem sculptum invenimus in alio marmoreo epitaphio T. Statilii Vol. Apri mensuris ædificiorum, quod operâ Jacobi Meleghini summi Pont. Architecti ex Janiculo non ita pridem refossam, in Vaticanum hortum translatus est. Quamvis jacentem in Basilicâ Apostolorum columnam ex porphyrite, cum his Græcis in calce literis ΠΟΔ. Θ. id est pedum novem, nos cum dimensi essemus, prehenderimus non respondere nostro eum, quo*
usus

¹ *Philander in li. 3. cap. 3. Vitruvii.*

usus fuerat ejus columna artifex, sed nostro esse majorem duobus scrupulis & besse, id est uncia parte nonâ. Vt argumentum aliquod esse possit pedis Graci fuisse modulo scapum columnæ factum; quod facilius conjicere potuisssem, si integra esset alia ex eodem lapide columna, quam in viâ latâ est conspiciere jacentem, his in calce literis ΠΟΔ IB insignitam. Verum quando stadium Herodoto l. 2. Heroni, Suida, cæteris Gracis sit sexcentorum pedum; Plinio, Columella, cæteris Latinis sexcentorum viginti quinque nostrorum, necesse est Romanum à Græco semunciâ superari. Thus far Philander. Not long after him Lucas Patus, having examined the foot on T. Statilius tombe, and that other of Cossutius, together with severall ancient ones in brasse, found amongst the

^m Luc. Patus l. *rudera at Rome, concludes: that the ^m true Ro-*
 1. de antiq. Rō. *mane foot dictis duobus marmoreis comparatus,*
 & Græc. in- *septimâ uncia parte, sive uncia scripulis tribus, &*
 intervall. mensu- *duabus scripulis sextulis, & sextula semisse bre-*
 ris. *vior est. Much about the same time I finde in*

Ciaconius out of Latinus Latinus, another ex-
 periment to have been made, by many eminent
 men together at Rome. Superioribus autem an-
 nis (saithⁿ he) Ant: Augustinus, qui postmodum
 fuit Archiepiscopus Tarraconensis, Io: Baptista
 Sigheicellus Episcopus Faventinus, P. Octavius
 Pacatus, Achilles Maffæus, Achilles Statius, Bene-
 dictus Ægius, Fulvius Ursinus, Latinus Lati-
 nius, cum veram pedis Rom. quantitatem statu-
 ere vellent, plures ejusd. pedis mensuras simul
 contulerunt, & earum octo cum antiquissimâ di-
 cti pedis formâ, quæ in basi quâdam in hortis Vati-
 canis extat, adamussim convenire videntes, ex
 hoc

* Ciaconius è
 Lat. Latinii
 observationibus
 de pede Rom.

Hoc pede quadrato vas confecerunt, quod etiam nunc octoginta aquæ, vel vini libras, quibus publicè signatis civitas utitur, omnino capere invenerunt, & cum octo congiis antiquis ita congruere, ut neque minus quidquam, neque amplius inter utraque esset. Quo experimento evidentissimè cognoverunt, & libras nostri temporis cum antiquis Romanis esse easdem, cum congii antiqui vas sub Vespasiano Imp: signatum decem libras contineret, quot etiam nostri temporis libras capit; & hunc esse justum pedem Romanum, cum ex ejus modulo perfectum Quadrantal octoginta libras contineat, quæ cum congii antiqui libris ad momentum respondent. Notwithstanding these observations, Villalpandus, knowing how necessary it was to have the true dimensions of the Romane foot, to find out the proportions of the Hebrew cubit, made new experiments: and after examination of the measures, and weights at Rome, he thus concludes. ° Sed iis omnibus tam variis, aliisque multis sententiis prætermis-
 sis, in hac unâ conquiescimus, ut arbitremur u-
 num Farnesianum Congium posse omnes antiquas
 Romanorum, atque aliarum gentium mensuras, omni-
 aq;ue pondera pristina integritati restituere. apparatus Vr-
 bis ac Templi.
 par. 2. l. 3. c. 25.
 And in another place. Quapropter aliis omnibus conjecturis, argumentationibus, æreis pedibus, marmoreis dimensionibus, aut sculpturis, quasi maris fluctibus prætermis-
 sis, in hac unâ pedis longitudi-
 ne, quasi in portu conquiescere jam tandem decre-
 vimus. Yet Snellius in his Eratosthenes Batavus, could not rest satisfied with this foot of Villalpandus, how exquisite soever he imagines it. For he had a minde to discover it neerer home:

making the Rhinland foot equal to the Romane. The proof of his assertion is taken from an ancient Romane *armamentarium*, or Fort, neer the sea, not far from *Leiden*, which by the Natives is called *het huys te Briten*: And is supposed by *Ortelius* to have been built by *Claudius Caesar*, in his intended voiage for *Britanne*, of which * *Suetonius*, and *Dio*, make mention: *sive in commo-*
diorem legionum, cohortiumque transvectionem,
sive quo milites hibernarent (saith *Ortelius*). *Arcis*
ipsius fundamenta, (according to ⁹ *Snellius*) *qua-*
dratâ sunt formâ, & quaquaversum ducentis qua-
draginta Rhinlandicis pedibus patent. Vt vel hinc
Romane mensuræ vestigia quàm planissimè agnos-
cas. Nam ipsius podismus duorum Romanorum ju-
gerum magnitudinem complectitur. Jugerum enim
mensuram ducentos & quadraginta longitudinis
pedes esse, non est ferè quisquam qui ignoret, inquit
Quintilianus l. 1. cap. 10. Varro de re rustica li-
bro 1. cap. 10. Jugerum quod quadratos duos ac-
tus habet. Actus quadratus, qui & latus est
pedes 120. & longus totidem. Is modius, ac mina
Latina appellatur. ut mihi planè dubium non vi-
deatur, eos hic Romane mensuræ modum secutos,
hujus structuræ podismum ita comprehendisse se-
cundum jugeri mensuram, ut duo jugera, vel
actus quatuor contineret. Frontinus de limitibus.
Hi duo fundi juncti jugerum definiunt, deinde hæc
duo jugera juncta in unum quadratum agrum
efficiunt, quod sint omnes actus bini: ut singula
ideò latera ducentos & quadraginta pedes in lon-
gum patere necesse sit. Atqui totidem pedibus
Rhinlandicis singula latera exporrigi Geodetarum
experientia confirmat. Unde efficitur Romanum
anti-

* *Suetonius in*
Claudio
Dio hist. Rom.
lib. 60.

⁹ *Snell. in Era-*
stoth. Bat. l. 2.
cap. 2.

antiquum pedē nostro Rhinlandico planè æquari.

After these experiments of so many able, and learned men, and those too taken from ancient Monuments, it may seem strange, that we should not be able as yet to define the true quantity of the Romane foot. For this I can assigne no other reasons then these, First, that those which have described it, have either not exactly, and with such diligence, as was requisite, performed it; or else, if they have been circumspect in this kind, they have omitted to compare it with the Standards for measures of other Nations. On the contrary, those which have compared it with the present Standards, never took it from the ancient Monuments; and Originals, which are at Rome, but onely from some draughts; or schemes, delineated in books. Now how uncertain a way this is, doth appear by *Villalpandus*; *Villalpand. de apparatu Urbis ac Templi par. 2. l. 3. c. 25.* who thus writes. *Ego dum hæc scriberem, hunc Colotianum pedem circino expendi, & in annotationibus Guil: Philandri solertissimi viri, & apud Georgium Agricolum, & apud Lucam Patum, & Stanislaum Grsepsium, & nullum potui reperire alteri æqualem, imo verò neque ejusdem pedis assignatas similes partes.* The same have I observed in those Romane feet described by *Portius*; *Agricola*, *Philander*, *Pærus*, *Ciaconius*, and *Villalpandus* himself; that they differ one from another: and not onely so, but those of the same Authour, in the same impression, are likewise different. Which last must arise; either by the diverse extention of the paper in the presse, when it is moist; or by the inequall contraction of it, when it grows dry, or by some

other accident, in the beating, and binding. So that though it were granted, that so many learned men had found out, what we inquire after, the Romane foot; yet it is impossible out of those schemes, and draughts, delivered in their books, for the reasons before specified, to attain an absolute certainty. But ¹ *Snellius* shews us a remedy of this difficulty, which in my opinion is as vain as his Romane foot, (seeing by his supposition all paper must shrink alike, be it thick or thinne) and that is, to allow one part in sixty for the shrinking of the paper. *For so much*, saith he, *doe Typographers observe, that letters contract themselves, when they are taken off wet from the types.*

¹ *Pars sexagesima typorum & formarum longitudini excusis decedat, quemadmodum à diligetibus & peritis typographis sciscitando edoctus sum.*

Snell. in Eratosth. Batavol. 2. cap. 1.

Wherefore having received small satisfaction from the writings of the Ancients, and not much better from the imperfect designations of the Romane foot by modern Authors, I proposed to my self in my travails abroad, these waies, which no reasonable man but must approve of. And those were first, to examine as many ancient measures, and monuments, in *Italy*, and other parts, as it was possible. And secondly, to compare these with as many Standards, and Originals, as I could procure the sight of. And last of all, to transmit both these, and them, to posterity, I exactly measured some of the most lasting monuments of the Ancients. To this purpose, in the year 1639 I went into *Italy*, to view, as the other Antiquities of the Romanes, so especially those of weights, and measures; and to take them with as much exactness, as it was possible, I carried instruments with me made by the best Artizans,

Where

Where my first inquiry was after that monumēt of *T. Statilius Vol. Aper*, in the Vatican gardens, from whence *Philander* took the dimensions of the Romane foot, as others have since borrow-^{c Philander in l. 3 c. 3. Vitruv. vii.} ed it from him. In the copying out of this upon an English foot in brasse, divided into 2000 parts, I spent at the least two houres (which I mention to shew with what diligence I proceeded in this, and the rest) so often comparing the severall divisions, and digits of it respectively one with another, that I think more circumspection could not have been used; by which I plainly discovered the rudenesse, and insufficiency of that foot. For besides that the length of it is somewhat too much, (whatsoever ^d *Latinus* out of an observation made by *Ant. Augustinus, Sighicellus, Pacatus, Maffæus, Statius, Ægius*, and *Fulvius Ursinus*, pretends to the contrary) there is never a digit, that is precisely answerable to one another. Howsoever it contains 1944. such parts, as the English foot contains 2000.

^e *Ciaconius d Latino Latinio.*

My next search was for the foot on the monument of *Cossutius*, in *hortis Colotianis*, frō whence it hath since received its denomination (though it be now removed) being termed by Writers *pes Colotiannus*. This foot I took with great care, as it did well deserve, being very fair, and perfect: afterwards collating it with that Romane foot, which *Lucas Patrus* caused to be ingraven in the *Capitol*, in a white marble stone, I found them exactly to agree; and therefore I did wonder, why he should condemne this with his pen (for he makes some

* *Luc. Pætus l. i* * objections against it) which notwithstanding
de antiq. Rom. he hath erected with his hands (as appears by
& Græc. inter- the inscription in the Capitol, C U R A N T E L U:
vall mensuris. P A E T O). It may be upō second thoughts, he after-
ward privately retracted his error, which he vvas
not willing to publish to the vworld. Now this of
Cossutius is 1934. such parts, as the English foot
contains 2000.

Next I sought after that Porphyry Columne
mentioned by * *Marlianus*, as also by * *Phi-*
** Marlianus de* *lander*, and others, with this inscription ΠΟΔ.
antiquit. Urbis. Θ. For if the length of that Columne were as-
** Philander in*
lib. 3. c. 3. Vi-
truvii. signed according to the proportion of the
Greek foot, then would the Romane foot be
thence deduced: this (as I shall elsewhere shew)
containing 24, such parts, as that contained 25:
Or if it were made according to the Romane
foot, as the Grecians after their subjection to
the Romane Empire, often used the same mea-
sures that the Romanes did, then had I my de-
sire. But the Column being defaced, or lost,
my labour was in vain: And it seems ² *Pætus*
² *Luc. Pætus l. i* about LXX. years before, made the same inquiry,
de antiq. Rom. with as little satisfaction.
& Græc. inter-
vall. mensuris.

I should be too tedious in describing the se-
verall feet, which I have perused in brasse,
found amongst the *rudera* at Rome, and care-
fully preserved by Antiquaries: of most of
which *Peireskius* hath given a good character,
in some letters of his, which I have seen in the
hands of *Buchardus*, a learned man, not yet
printed. ^a Who thus writes: I cannot suffici-
^a *Ex Epistolis*
Peireskii MSS. ently wonder at the inequality which I have found
in the divisions by digits, and inches, of the an-
cient

cient Romane feet ; which seem to me to have been made for fashion sake, & *dicis causâ* (as lamps that are found in tombes incapable of oile) more to expresse the mystery , and profession of those that were to use them, then for to regulate the measure of any thing besides them.

Besides these , I examined the ancient Structures of the Romanes, hoping by collating one with another, to deduce the dimension of their foot. For I presumed that those excellent Architects, before they began their work, must necessarily propose some models to themselves, according to the proportions of which , they meant to raise their fabricks: which proportions could not be assigned , but in the parts of some common, and received quantity ; and this in probability was the Romane foot ; being a measure generally used, and by publick authority prescribed. Upon which grounds , I measured the stones in the foundation of the Capitoll, Domitians', or rather Vespasians' amphitheater, the triumphall arcs of Titus, and Severus, together with that of Constantine the great, and above all that exquisite temple of the Pantheon, built by Agrippa, I know not whither with more cost, or art : concerning which ^b Sebastianus Serlius is of opinion , that if all rules of Architecture were lost, they might be revived out of this monument alone. And in truth , this place gave me more satisfaction then any other. For most of the white marble stones on the pavement, contained exactly three of those Romane feet on Cossutius' monument, and the lesser stones in Porphyry contained one and an half.

But yet I thought this not sufficient, unlesse I

went to *Tarracina*, which is the ancient *Anxur*, and *LIII*. miles distant from *Rome*: having read in ^c *Andreas Schottus*, out of *Pighius' Hercules Pro-*
^e *Andr. Schott:* *dicinus*, that neer the sea by the *via Appia*, in the
itinerar. height of a white rock, whence that of ^d *Horace*,

Impositum saxi latè candentibus Anxur,

^d *Horat. l. 1.*
Serm. Sat. 5.

there are described the Romane *decempeda*. And indeed the place is very memorable, for the whitenesse, altitude, and hardnesse of the rock, which notwithstanding is cut away perpendicularly, on the side towards the Tyrrhene sea, above an hundred and twenty feet in depth, to make passage for the Appian way; and at the space of every *decempeda*, these characters X XX XXX &c. (being almost *cubitales*) are fairly ingraven in a continued order descending to CXX. Measuring below the distance between CXX and CX, it amounted to *IX*. English feet, and $\frac{1384}{10000}$ of a foot computing it from the * line ingraven above CXX to the line next under CX. The rest I examined with my eyes, by often comparing the distance between CXX and CX whither it were equall to that between CX and C, and this again (ascending upwards) to that between C and XC. which manner though it be uncertain, and conjecturall, and farre from that exactnesse, I used in all others, yet it was the best means I could then put in practise; and I am confident that whosoever shall measure those spaces, shall find a manifest inequality. To which opinion I am the rather induced, because measuring there, in severall places, the breadth of the Appian way, cut out of the same rock, I found a difference sometimes of one, or two inches, or more. It being in one place

* See at the end of this book the figure of these characters as they are cut in the rock at *Anxur*, with lines incompassing them.

place XIII. English feet, and $\frac{163}{200}$ of a foot, in another, XIII. feet and $\frac{1880}{3000}$ in a third XIII. and $\frac{1275}{2000}$. Whereby I concluded, that the Ancients in making that way, had not respect to a Mathematicall point (as it was not necessary) but onely that if any difference were, it should not be sensible. And such differences have I observed in the white Corinthian pillars, in the Pantheon before mentioned, of above an inch, or two, in the circuit of the *scapus*, neer the *torus*: vvhich inequality, seeing no eye could discover, the masters of that exquisite vwork did justly contemn. Whereas the Porphyry stones, and those of white marble, on the pavement, are sized so eeven, and so exactly to the proportions of the Romane foot, that nothing can be more accurate. And this the nature of the vwork required. For the temple being round (which hath occasioned the *Italians* vulgarly to call it the *Rotundo*) the circle within, could not so exquisitely have been filled up, if there had not been a speciall care taken in observing the true dimensions, in every particular stone. But to return to the rock at *Anxur*; the spaces between those characters, to an eye, that shall be intently fixt upon them, will be apparently different. So that I concur in opinion with * *Schottus*, that those figures * *Schotti itiner.* were placed there, to give notice to posterity, how much of the rock had been removed, to make passage for the *Appian way*; and not for any memoriall of the Romane measures.

Having measured those places in the *Appian way* at *Tarracina*, I made triall of at least XX. others

others between *Tarracina*, and *Naples*, without any great satisfaction; and therefore partly the incertainty that I found there, and partly the danger of theeves, discouraged me from measuring the Romane *milliare*; a work conceived to be of great use, for the discovery of the Romane foot. Seeing the *milliare* containing *mille passus*, as the very name imports, and every *passus* consisting of five feet, as ^c *Columella*, and ^e *Isidorus*, expressly tell us, here therefore would be 5000 feet to help us to one, could there be but found out a perfect Romane mile. And this I imagined might probably be discovered amongst those many *vestigia* of Romane waies, which to this day are frequently seen in *Italy*. Wherefore conferring with *Gasparo Berti*, a man curious, and judicious (as appears by his ichnography of *Roma Subterranea* in *Bosius*) as also with *Lucas Holstenius*, a learned companion of *Cluverius*, in those honourable travails of his, for the restauration of the ancient Geography: they both informed me, that there are still in the Appian way, where it passes over the *Pomptinae paludes*, severall *columnae*, or *lapides miliarii*, standing; whereby the Romanes divided, and distinguished their miles; and which occasioned those phrases, *ad primum*, *ad quartum*, *ad centesimum lapidem*, and the like. And these, it may be, at the first were ordinary stones, till *C. Gracchus* caused columnes to be erected in their places: Διαμετρήσας καὶ μίλιον ὁδὸν πᾶσαν. (τὸ δὲ μίλιον ὅκτω σταδίων ἐλίξεν ἀποδεί) κίονας λίθινας σημεῖα τῶ μέτρου κατέστησεν. He measured out, saith *Plutarch*, by miles all the waies,

^a *Columella de Re Rust. l. 5.*
^e *Isidorus l. 15.*
^c 15. Origin.

^e *Plutarchus in Gracchis.*

waies, the mile containing little lesse then eight stadia, and placed columnnes of stone to designe the measure. The thing vvas of that ornament, and use, as that it was afterwards taken up, and continued by the Romane Emperours; as appears by these inscriptions, which are fairly ingraven on the first columnne, found amongst the ruines in the Appian way, and from thence lately removed into the Capitol, by order of the * Senate, and people of Rome,

* S. P. Q. R.

COLVMNAM. MILIARIAM
PRIMI. AB. VRBE. LAPIDIS. INDICEM
AB. IMPP. VESPASIANO. ET. NERVA
RESTITVTAM
DE. RVINIS. SVBVRBANIS. VIAE. APPIAE
IN. CAPITOLIVM. TRANSTVLIT

I

IMP. CAESAR
VESPASIANVS. AVG
PONTIF. MAXIM
TRIB. POTESTAT. VII
IMP. XVII P.P. CENSOR
COS. VII DESIGN. VIII

Below this, on the end of the Scapus,

IMP. NERVA. CAESAR
AVGVSTVS. PONTIFEX
MAXIMVS. TRIBVNICIA
POTESTATE. COS. III PATER
PATRIAE. REFECIT

*Below this, on the Basis
of the same pillar.*

IMP. CAESARI. DIVI
TRAIANI. PARTHICI. F
DIVI. NERVAE. NEPOTI
TRAIANO. HADRIANO
AVG. PONTIF. MAXIM
TRIB. POTEST. II COS. II
VIATORES. QVI. IPSI. ET. COS. ET
PR. CETERISQVE. MAGISTRA TIB
APPARENT. ET. H. V.

To these I shall also add the inscription of another *columna milliaria*, not extant in *Gruterus*, or any other, that I know, which I have seen at *Tarracina*; the columnne being exactly of the same magnitude with the former, but wanting by the injury of time, a *basis* below, & a globe, of nigh three feet diameter on the top, serving instead of a capitel, both which the former hath.

X

IMP. CAESAR
 DIVI. NERVAE
 FILIVS. NERVA
 TRAIANVS. AVG
 GERMANICVS
 DACICVS
 PONTIF. MAX
 TRIB. POT. XIII
 IMP. VI COS. V P. P
 XVIII SILICE. SVA. PECVNIA
 STRAVIT

LIII

* The figure X signifies the distance of Tarracina from the next City, or Town, in the way to Rome: And that was, *Ad medias*: a place so called, either because it was, *ad medias paludes*, or else because it was in the midway almost between Tarracina, and

Appii forum. For it was X. miles from Tarracina, and IX. from *Appii forum*; as appears by the *Itinerarium Hierosolymitanum* in *Bertius*.

Appii forum
 Ad medias IX.
 Tarracina X.

The figure LIII below, signifies the distance of Tarracina from Rome: Which distance may be farther proved out of *Appian*, in his third book of the Civill wars, speaking of *Augustus*: "Οὐτὶ αὐτῷ πρὸς Ταρρακίνας ἀπὸ τετρακοσίων πρὸς ἑξήκοντα στάδιων. Being about Tarracina, which is distant CCCC. stadia from Rome. These stadia reduced to miles, if we allow VII. Greek stadia, and an half, to a Romane mile, as *Suidas* doth, will make up LIII. miles, and one third part of a mile; that is, two stadia, and an half over and above. Which fraction *Appian* neglects; and therefore uses the round number CCCC. stadia for LIII. miles.

The figure XVIII signifies the *Decennovium*, or way passing over the fens, between *Appii forum*, and Tarracina: so denominated, because it contained nineteen miles in length: which may also be proved out of *Procopius*, where he speaks of the *Δεκαννόμιον*. This way was paved by *Traian*, as the inscription shews, and I think first of all by him. Long after it was repaired by *Theodoricus*, according to another inscription, that I have seen at Tarracina, of which *Gruterus*, and *Cluverius*, also make mention; where, omitting the titles of *Theodoricus*, in the marble we finde these words ingraven.

DECEN-

DECENNOVII. VIAE. APPIAE. ID. EST. A. TRIP
 VSQVE. TERRACENAM. ITER. ET. LOCA. QVAB
 CONFLVENTIBVS. AB. VTRAQVE. PARTE. PALVDVM
 PER. OMNES. RETRO. PRINCIPVM. INVNDAVERANT
 VSVI. PVBLICO. ET. SECVRITATI. VIANTIVM
 RESTITVIT. PER
 PLVRIMOS. QVI. ANTE. NON. ERANT. ALBEOS
 DEDVCTA. IN. MARE. AQVA

By this number XVIII. signifying the *decennovium*, and by the *Itinerarium Hierosolymitanum*, we may safely correct the *Itinerarium Antonini*, in which *Tarracina* is placed but XVIII. miles distant from *Appii forum*. And from hence likewise we may certainly know how farre the Christians went to meet Saint Paul, and that was XXXIV. miles. For so much was *Appii forum* distant from *Rome*, if we subduct XVIII. out of LIII. whereas the *Itineraries of Bertius* Edition make it more.

If therefore two such columnes were found intire, (as I am informed there are four, or five, in the *Decennovium*, standing in a continued order) the distance between two such being exactly measured, vould much conduce to the discovery of the Romane foot. Upon vvhich supposition, I had almost resolved to have gone thither, as I did to other places, vvith no other intention, but only to have been a spectator of those Columnes, and to have trusted to mine own hands, in taking their distances. But upon a more deliberate examination of the businesse, I perceived that this inquiry did depend upon a very nice supposition. For if the *Decempeditores*, or *Curatores viarum*, proceeded not with extreme caution, and aimed almost at a Mathematicall point, in designing the just space of each particular mile (which in a work of that length

length is not probable; vvhhere the inequality of many feet could not be discerned by the eye, and might be admitted without any blemish. For in * *Varro's judgement, Sensus nullus quod abest mille* * *Varro de L. L. passus sentire potest*) it could not be, but the same lib. 5.

differences, or somewhat like, must have crept in with them, which have been observed amongst us, in our measured, and statute miles; out of vvhich it vvhould be a vain attempt exactly to demonstrate the English foot. The neglect of which circumspection, amongst some other reasons, that may be assigned, I take to be one, of the diversity, which Astronomers found in that memorable observation, made in the planes of Singiar, or Sinar, by the command of *Almamun*, the renowned Calife of Babylon, about eight hundred years since, in proportioning the magnitude of a degree upon earth. For having taken the altitude of the pole at two severall stations, differing a degree in the heavens, they measured the distance between these stations on earth, going on in the same Meridian; where ^h *some of them*, saies *Abulfeda*, found it to be fifty six miles, and two thirds, others fifty six, without any fraction. If therefore the Romane *decempedatores*, or *geodetae*, used not more circumspection, then the Babylonian Astronomers (which is not likely), there can be no trust given to their miles, and lesse trust to the foot, that shall be deduced from thence.

Wherefore to come to a conclusion; having made inquiry more waies, then it may be any man hath done, and I think vvhith as much caution, and exactnesse, as any, it will be necessary after

فكان
م—ع
احدهما
ستة
وخمسون
ميلا وثلثا
وم—ع
الاخرى
ستة
وخمسون
ميل بغير
كسر

Abulf. Geogr.
Arab. MS.

after all to shew amongst so many feet, as are taken to be Romane, vvhich I conceive to be the most genuine, and true. And though in such an incertainty, and scarcity of ancient monuments, and in such a diversity of opinions, amongst modern Writers, it may seem too great presumption, positively to define the magnitude of the Romane foot; yet having had the opportunity, to have perus'd in this kind, more antiquities, then any that have preceded, I may with the more confidence conclude, that the *Pes Colotianus*, in my judgment, is the true Romane foot; and that for these reasons.

For first, it most exactly agrees with some very ancient, and perfect Romane feet in brasse, found long since amongst the *rudera* at Rome: especially with that excellent one (as I remember) of *F. Vrsinus*, a learned Antiquary. Though I cannot deny but that I have seen two ancient feet in brasse, different from this; the one of *Gualdus*, a very fair one, wanting two parts and an half, of such as this contains a 1000. a small, and inconsiderable difference. The second of *Gottifridus*, a Gentleman of honourable quality, (to vvhom I stand obliged for the free donation of severall antiquities) which exceeds it by eight parts; but this last hath been made by a very rude, and unskillfull hand.

Next, the proportions of almost all the white marble stones, as also of those lesser in porphyry, in the pavement of that admirable temple of the *Pantheon*, are either completely three of these feet, or one and an half; which,
it

it is not probable, in a structure of so much art, should have been the vwork of chance. Add to this the dimensions of severall stones, in the foundation of the *Capitol*, in *Titus*, and *Severus*, triumphal arc's, corresponding either to the whole foot, or conjointly to the whole, and some *uncia*, or digits of it.

Thirdly, the inscription on the same monument, vvhether this foot is found, of the *circinus*, the *libella*, the *norma*, and the like, plainly shew that these were intended to expresse *Cossutius*' profession, (whom ⁱ *Patrus* imagines to have been a *sculptor*) and this being intended, I see no reason why the Romane foot should have been cut in so fair a relevy, either too short, or too long; when the same hand, and the same pains, might have made it exact. It is true, that the foot upon *Statilius*' tombe, is 1944. such parts, as this is but 1934. whereof the English foot taken by me from the iron yard, or standard of three feet in Guildhall in *London*, contains 2000: but how rudely in respect of digits, that foot of *Statilius* is described, I have before discovered. And therefore I wonder that

ⁱ *Luc. Patrus*
lib. 1. de antiqu.
Rom. & Græc.
interval mens-
suris.

^k *Philander* in his Commentaries upon *Vitruvius*, should in a matter of such high concernment in Architecture, proceed vvith so much inadvertency, affirming that between this of *Statilius*, & that of *Cossutius*, there is no difference. And if he a Mathematician, hath thus erred, (though commonly men versed in those sciences take not up things at too cheap a rate, without due examination) what opinion may vve conceive of another observation, made at the same monu-

^k *Philander in*
li. 3. c. 3. Vitru-
vii.

D

ment;

¹ *Ciaconius è Latini Latini observ. de pede Rom.*

ment, by ¹ *Ant. Augustinus*, *Jo: Baptista Sighicellus*, *P. Octavius Pacatus*, *Achilles Maffens*, *Achilles Statius*, *Benedictus Aegius*, *Fulvius Ursinus*, *Latinus Latinus*, with as many ancient feet, as there were men present? I shrewdly suspect they flubbered over their observation, as not regarding in nineteen hundred parts, and better, the small excess, or defect, of ten parts: or not rightly apprehending what might be the consequences of such an error, how little soever, in measuring the vast magnitude of the terrestriall globe, or of the celestiaall bodies.

^m *Villalpandus l. 2 disp. 2. c. 11 de apparatu Urbis ac Templi.*
ⁿ *Fragmenta Dioscoridis.*
^o *Sext. Pomp. Festus de Verb. signif.*

^p *Rhemus Fann. carm. fragm. ** It had been better to have made my experiment with water, and then to have weighed it with an exact balance: but because no balances are found in Rome so exact as with us, I was fain to measure it with *milium*.

Lastly, besides the authorities of *Portius Vicentinus*, *Georgius Agricola*, *Glareanus*, *Ghetaldus*, *Donatus*, and of many other learned, and judicious men, who approve of this *Pes Colotianus*, (though bare authority is the worst, because the weakest kinde of argument) that excellent *Congius* of *Vespasian*, now extant in Rome, so highly and so justly magnified by ^m *Villalpandus*, may likewise serve to confirm, if not totally my assertion, yet thus far, that I have not exceeded in assigning the true longitude. For by the cleer evidences of ⁿ *Dioscorides*, and of an *anonymus Anthour* before cited, eight *Congii* are the just measure of the Romane *amphora*, or *quadrantal*, and again by as many testimonies of ^o *Sextus Pompeius*, and ^p *Rhemus Fannius*, each of the sides of the *amphora* is equall in longitude to the Romane foot. Wherefore having procured by speciall favour the *congius* of *Vespasian*, I took the measure of it with ^{*} *milium* (being next to water, very proper for such a work) carefully prepared, and cleansed, which being done, with much

much diligence. I caused a cube to be made answerable to the true dimension of the *Pes Colotianus*; filling up the capacity of which, and often reiterating the same experiment, I found continually the excesse of about half a *congius* to remain, and that an *amphora* made by the *Pes Colotianus*; would contain but VII. *congii*, and about an half. And therefore I cannot sufficiently wonder at the observation^r of *Ant. Augustinus*, *Pacatus*, *Maffæus*, *Statius*, *Vrsinus*, and others, with a cube of that foot, which is described on *Statilius'* monument: who affirme the *quadrantal* of this exactly to contain eight of these *congii* of *Vespasian*. Whereas upon due examination I confidently affirm, that they have erred. And therefore *Villalpandus* in this particular, with more judgement, and ingenuity, hath published his observation, concerning the measure, and precise weight, of *Vespasians'* *congius*, then any other whatsoever. Although I cannot be induced to assent to that deduction, which he infers of the Romane foot, (from the side of a *quadrantal* containing eight of these *congii*) relying upon the authorities of *Festus*, and *Fannius*, against so many evidences, produced to the contrary. Wherefore as he is singular in his opinion (for there is not one author of credit, which follows his assertion) so is his foot as singular, there being not one, of at least ten ancient ones, in the hands of severall Antiquaries (besides those inscribed on two Monuments in *Rome*) vvhich arrive to the proportions of his, by XXVII. parts in 2000. As for those other fancies of his (for they are no bet-

* *Ciaconius* è
Latini Latinii
observationibus
de pede Rom.
Cum veram pe-
dis Rom. quan-
tatem statuere
vellent ejusd.
pedis mensuras
simul contuler-
unt, & earum
octo cum anti-
quissima dicti
pedis forma,
quæ in basi qua-
dam in hortis
Vaticanis ex-
stat, adamussim
convenire vi-
dentes, ex hoc
pede quadrato
vas confecerunt
&c. Vide
supra.
^r *Villalp. de*
apparatu Urbis
ac Templi par.
2. lib. 3. c. 25.

^a Vides etiam
latus cubicum
modii, semicon-
gii, sextarii, he-
mina, &c. Vil-
lalp. ibidem.

ter) of describing also the Romane foot, by the altitude of *Vespasians' congius*, and assigning the ^c *latus cubicum*, of the *modius*, the *semicongius*, the *sextarius*, and *hemina*, from certain parallel circles circumscribed about it, (vvhich certainly, as the scheme of the *congius* it self, drawn by me to the full proportion, shews, were delineated without any farther intention then for ornament) I doe not think them worth the confusion.

And therefore it will be much better to give some solution to those authorities of *Sextus Pompeius*, and *Rhemnius Fannius*, alleaged by him. For the objection vvhich may be raised thence is very materiall: How the *Pes Colotianus* can be the true Romane foot, since it is confessed by me, that it doth not precisely answer to the sides of a *quadrantal*, or cube, containing eight of those *congi* of *Vespasian*, or XLVIII. *sextarii*? Whereas on the contrary, *Festus* expressly writes, that the *quadrantal* was the square (he means the cube) of the Romane foot.

^a Sext. Pomp.
Festus de Verb.
signif.

^a Rhema. Fan-
nii carmina de
pond. & men-
suris.

^b *Quadrantal vocabant Antiqui, quam ex Græco amphoram dicunt, quod vas pedis quadrati, octo & quadraginta capit sextarios.* And ^x *Fannius* confirms the same.

*Pes longo spatio, latoque notetur in anglo,
Angulus ut par sit, quem claudit linea triplex.
Quattuor ex quadris medium cingatur inane:
Amphora fit cubus: quam ne violare liceret,
Sacravêre Iovi Tarpeio in monte Quirites.*

We might elevate their authorities by saying, these are only the testimonies of two Gram-
marians,

marians, better versed in disputes of vvords, then
 criticall in measures, which more properly are
 the speculation of Mathematicians: and there-
 fore if *Vitruvius* had affirmed it, much
 more credit might have been given. But we
 shall rather say, they wrote vvhat was vulgar-
 ly, and commonly, upon tradition beleevd,
 that the length of one of the sides of the *ampho-
 ra* was equall to the Romane foot: not that
 it was precisely, and exactly equall, but that of
 any known measure vvhatsoever then extant,
 this came the neereſt to it, as indeed it doth;
 yea, so neer, that if at this day the *amphora*,
 and Romane foot, were in use amongſt us, ma-
 ny a writer that had never been so curious, as
 diligently to compare them, would not be scrup-
 ulous to affirm as much. Which may appear
 by the practise of *Ant. Augustinus, Pacatus,*
Maffeus, Statius, Vrsinus, and of severall other
 learned men, not long before our times: Who
 though they purposely made it their inquiry, to
 discover the true Romane vveights, and mea-
 sures, and therefore made speciall use of this
Congius of *Vespasian*, yet have no lesse erred; as
 we shewed before, in the dimension of the *am-
 phora*, then both *Festus*, and *Fannius* have done.
 Neither will this answer seem improbable con-
 cerning measures, if we shall examine a place,
 or two, concerning coins, in which the anci-
 ents, and those too of the better sort of Au-
 thors, have in the very same manner erred. For
Livy writing that *Marcellus* gave to *L. Ban-
 tius* (or *Bandius*) *15. bigati*, that is *denarii* (so
 called because the *biga* was ordinarily stamped
 upon

Livius l. 23.

^a *Plutarchus* in *Marcello*. upon the reverse of the *Denarius*): ^z *Plutarch* describing the same gift, renders it by so many *drachmæ*, the Grecian manner of computation; not that the *drachma* in the exact, and intrinsecal valuation, was equall then to the *Denarius*, or the *Denarius* to the *drachma* (as we shall shew in the ensuing discourse) but that in the vulgar, and popular estimation, the one passed for the other, being both not much different in their weight, as well as valuation. ^a Likewise *Dio* informs us, that *Octavius* promised the *Veterane* souldiers $\overline{15}$. *drachma* a man: whereas ^b *Cicero* expressing the same thing to *Atticus* terms them $\overline{15}$. *denarii*. And *Suetonius* writes that *Caesar* by Testament gave to each of the common people *sestertia trécenta*, that is, $\overline{LXXV}$. *denarios*, which ^c *Plutarch* both in the life of *Brutus*, and of *Antonius*, renders $\sigma\pi\alpha\chi\mu\acute{\alpha}\varsigma\ \epsilon\beta\delta\omicron\mu\acute{\iota}\kappa\omicron\nu\tau\alpha\ \pi\acute{\epsilon}\nu\tau\epsilon$ *seventy five drachmæ*. In like manner we may say, that *Festus*, and *Fannius*, have described the *amphora* by the Romane foot; not as if this were the exact measure of it, but as being the most known, and neereest proportion, in which, without falling into fractions, it might evenly, and roundly be expressed.

And thus have we finished our inquiry after the Romane foot: our next labour should be to

to compare it with the present Standards, and
Originals, for measures of divers Nations. For
which I must refer the Reader to this insuing
Table,

D 4

The

Of the Romane Foot.

SEMIPES ROM

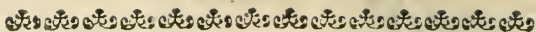
SEMIPE.S. ROM *The Romane foot compared with the measures of divers Nations.*

S	Vch parts as the Romane foot, or that on the monument of <i>Cossutius</i> in <i>Rome</i> , contains—	1000
	The foot on the monument of <i>Statilius</i> in <i>Rome</i> , contains—	1005 $\frac{12}{100}$
	The foot of <i>Villalpandus</i> , deduced from the <i>Congius</i> of <i>Vespasian</i> , contains —	1019 $\frac{65}{100}$
	The ancient Greek foot, being in proportion to the ancient Roman foot, as XXV to XXIV, contains	1041 $\frac{67}{100}$
	The English foot—	1034 $\frac{13}{100}$
	The Paris foot—	1104 $\frac{45}{100}$
	The Venetian foot—	1201 $\frac{65}{100}$
	The Rhinland foot, or that of <i>Snellius</i> —	1062 $\frac{25}{100}$
	The Derah, or cubit, at <i>Cairo</i> in <i>E.</i> <i>gypt</i> —	1886 $\frac{25}{100}$
	The Persian arish—	3305 $\frac{10}{100}$
	The greater Turkish pike at <i>Con-</i> <i>stantinople</i> —	2275 $\frac{08}{100}$
	The lesser Turkish pike at <i>Constan-</i> <i>tinople</i> , is in proportion to the greater, as 31 to 32 —	
	The braccio at <i>Florence</i> —	1908 $\frac{28}{100}$
	The braccio for wollen at <i>Siena</i> —	1284 $\frac{38}{100}$
	The braccio for linnen at <i>Siena</i> —	2041 $\frac{37}{100}$
	The braccio at <i>Naples</i> —	2171 $\frac{65}{100}$
	The canna at <i>Naples</i> —	7114 $\frac{72}{100}$
	The vara at <i>Almaria</i> and at <i>Gibral-</i> <i>tar</i> in <i>Spain</i> —	2854 $\frac{19}{100}$
	Il palmo di <i>Architetti</i> at <i>Rome</i> , whereof X make the canna di <i>Architetti</i> —	756 $\frac{98}{100}$
	Il palmo del braccio di <i>Mercantia</i> , & di <i>Tessito di Tela</i> at <i>Rome</i> ; this and the former are both ingraven in a white marble stone in the Capitol with this inscription. <i>Curante Lu. Peto</i> —	719 $\frac{24}{100}$
	The Genoa palm —	842 $\frac{81}{100}$
	The Anwerpell —	2360 $\frac{21}{100}$
	The Amsterdam ell —	2345 $\frac{43}{100}$
	The Leyden ell—	3337 $\frac{13}{100}$

*The English foot taken from the iron Standard
at Guild-hall in London, and compared
With the Standards for measures of
divers Nations.*

Such parts as the English foot contains ———	1000
The Romane foot, or that on the monument of <i>Cossutius</i> in <i>Rome</i> , contains ———	967
The foot on the monument of <i>Statilius</i> in <i>Rome</i> , contains ———	972
The foot of <i>Villalpandus</i> , deduced from the <i>Congius</i> of <i>Vespasian</i> , contains ———	986
The Greek foot ———	1007 $\frac{1}{2}$
The Paris foot ———	1068
The Venetian foot ———	1162
The Rhinland foot, or that of <i>Snellius</i> ———	1033
The Derah, or cubit, at <i>Cairo</i> in <i>Egypt</i> ———	1824
The Persian arish ———	3197
The greater Turkish pike at <i>Constantinople</i> ———	2200
The lesser Turkish pike at <i>Constantinople</i> is in pro- portion to the greater, as 31 to 32 ———	
The braccio at <i>Florence</i> ———	1913
The braccio for wollen at <i>Siena</i> ———	1242
The braccio for linnen at <i>Siena</i> ———	1974
The braccio at <i>Naples</i> ———	2100
The canna at <i>Naples</i> ———	6880
The vara at <i>Almaria</i> & at <i>Gibraltar</i> in <i>Spain</i> ———	2760
<i>Il palmo di Architetti</i> at <i>Rome</i> , whereof X make the <i>canna di Architetti</i> ———	732
<i>Il palmo del braccio di Mercantia, & di Tessito di Tela</i> at <i>Rome</i> : this and the former are both in- graven in a white marble stone in the Capitol with this inscription <i>Curante Lu. Pato</i> ———	695 $\frac{1}{2}$
The <i>Genoa</i> palm ———	815
The <i>Anwerp</i> ell ———	2283
The <i>Amsterdam</i> ell ———	2268
The <i>Leyden</i> ell ———	2260

*This Table I made by the Standards, the former
by proportion,*



OF THE DENARIVS.



S I have made for measures the Romane foot, the foundation of my inquiry, and therefore have handled it in the precedent Treatise: so for finding out of weights, I shal take the *denarius* as an undeniable principle, from whence those of the ancients by a necessary consequence may be inferred. For as the unity is in respect of numbers, or the *sestertius* in discourses *de re nummariâ*: so is the *denarius* for weights, a fit rise, or beginning, from whence the rest may be deduced. Not but that it were better (as I gave the caution before) if we absolutely consider the exactest waies of discovering weights, to begin vvith the greater, and by them to find out the lesse, then by the lesse, to produce the greater; but if we look upon the condition of times, and consider the means that are left after so many revolutions, and changes of the Romane Empire, it will be safer to alter our method. For to this day there are many thousand *denarii* left, and amongst these some so perfect, and intire, as if they had been but newly brought from the mint, whereas of the Romane *libra*, and ounces, there are but few extant, if compared vvith these. *Lipsius*, and *Gruterus* in their inscriptions mention some, and *Petus* some others, besides such as I have seen in the hands of Antiquaries, and many of mine own: most of which differ from one another, either as having been consumed by

by rust, and time, or it may be also by the men that then lived, for their advantage lessened : a thing too often practised amongst us. Wherefore I think it more convenient by the *denarius* to deduce the proof, and evidence of these, then by the diversity, and uncertainty of these to conclude the *denarius* : And yet if some of the best, and fairest of them, shall agree with this, I shall think my self so much the more assured,

Now seeing the *denarius* may be considered in a double respect, either as *nummus*, or as *pondus*: in the first acception, the valuation of it in civill affairs is remarkable, in the later, the gravity, and ponderousnesse : I shall speak no farther of the former, then as it may conduce in some sort to illustrate the later. The *denarius* was a silver coin in use amongst the Romanes, passing at the first institution for *dena ara*, or ten *asses*.

And so ^a *Vitruvius* expressly writes, *Nostri autem primò decem fecerunt antiquum numerum, & in denario denos areos asses constituerunt.* The same thing is attested by ^b *Volusius Metianus*. *Denarius primò asses decem valebat, unde & nomen traxit.* ^c *Pliny*, besides a confirmation of the same valuation, assigns also the time, in which it was first stamped. *Argentum signatum est anno Urbis * quingentesimo octogesimo quinto, Q. Fabio consule, quinque annis ante primum bellū Punicum, & placuit denarius pro decem libris aris:* that is, for ten *asses*. For the *asses* both then, and under the first Consuls were *librales*. *Dionysius Halicarnassensis.* Ἡ γὰρ δὲ ἀσάειον, χαλκεὶον νόμισμα, βάρους λίτραϊον. The *assis* was a brasse coine, weighing a pound. Where by the way it is worth the observation,

^a *Vitruv. l. 3. c. 1.*

^b *Vol. Metianus de assis distributione.*

^c *Plinius l. 33. c. 3.*

^{*} *Budæus l. v. de asse, corrects these numbers by Livy (l. xxx) and reads them 478.*

vation, the strange, and in mine opinion, the unadvised proportion, betwixt the brasſe, and ſilvermonies, of thoſe times: that $\overline{X}$. pounds of brasſe ſhould be but answerable to the 84th part (for ſo much, or neer it, was the *denarius*) of a pound of ſilver; or to ſpeak more clearly, that one pound in ſilver ſhould be equall in valuation to 840 pounds in brasſe. Neither can there be any excuſe of that errour, unleſſe this, that there then was an infinite plenty of the one, and as great a ſcarcity of the other. However it were, the ſame proportion is teſtified by *Varro*, who farther addes; that the Romanes took the firſt uſe, and invention of the *denarius*, from the *Sicilians*. ^d *In argento nummi, id à Siculis, denarii quòd denos æris valebant.* And according to this valuation the *denarius* had an impreſſe upon it of the figure X, denoting the *decuſſis*, or number of the *asses*, as *Valerius Probus* witneſſes, and ſometimes this character $\overline{X}$; both vvhiç I have ſeen, and can ſhew, in ſeverall ancient ones. This later by the ignorance of Scribes formerly in *MSS.* and of our Printers of late in the edition of *Celſus*, and of *Scribonius Largus*, is repreſented by an aſterisc *; and by a worſe errour in the ſame authors, the figure X expreſſing the *denarius*, as a *pondus*, is confounded with the figure X expreſſing a number. From this figure on the *denarius*, or *decuſſis*, ^e *Vitruvius* calſ the interſections of lines, *decuſſes*, and *decuſſationes*. And ^f *Columella* uſeth the phraſe *in ſtellam decuſſari*, when lines meet diamond-wiſe, or lozenge-like, as theſe in the character X or $\overline{X}$. Neither did the

denarius

^b *Varro l. 4.*
^c *de Ling. Lat.*

^a *Vitruv. l. 10.*

^e *Columella l. 5.*

denarius long passe at the valuation of $\overline{\text{X}}$. *asses*, nor the *asses* which before, and then were *librales*, continue at one stay, but with the exigencies of the Romane State, the rate of the *denarius* rose, and the weight of the *asses* fell; that is in effect, both the silver, and the brasse monies, came to be augmented in their estimation. For by a publick edict of *Fabius Maximus* the Dictator, the Common-wealth being hardly pressed upon by *Hannibal*, the *denarius* came to be priced at $\overline{\text{XVI}}$. *asses*, and the *asses* which were then *sextantarii*, or the sixth part of the Romane pound, (for in the first Punick war, by reason of the excessive expenses of the State, they first fell from being *librales*, to be *sextantarii*) came now in the second Punick war to be *unciales*. The whole progresse, and manner of this alteration, is by none so well, and fully exprest as by $\S$ *Pliny*, and therefore I shall a litle insist upon his words. *Silver*, saies he, came to be coined in the 585th year of the City, *Q. Fabius* being Consul, five years before the first Punick war, and then the *denarius* passed for $\overline{\text{X}}$. pounds of brasse, the *Quinarius* for five, the *sestertius* for two pounds and an half. The weight of the *assis* in brasse was diminished in the first Punick war, the Common-wealth not being able to support the expenses, and then it was decreed that the *asses* should be coined *sextantario pondere*; that is, with the weight of the sixth part of a pound, or two ounces, whereas before they were *librales*. Though *Alciatus* here upon a very grosse mistake contends that they were then coined *dextantario pondere*, and not *sextantario*, but yet that they

$\S$ *Argentum signatum est Anno Urbis 101xxxv.*

Q. Fabio Cos. quinque annis ante primum bellum Punicum. Et placuit denarius pro X libris æris, quinarius pro quinque, sestertium pro dupondio, ac semisse. Libræ autem pondus æris immutatum bello Punico primo, cum impensis Resp. non sufficeret, constitutumque ut asses sextantario pondere ferirentur. Plin. lib.

33.c.3.

were

^h *Sext. Pompeius Fest. de verb. signif.*

ⁱ *Plin. l. 33 c. 3. Ita quinque partes factæ luri dissolutumque æs alienum.*

^k *Agricola lib. 2 de pondere & temperat. monetarum.*

^l *Vallalp. de appar. urbis ac templi par. 2. l. 2. diss. cap. 9.*

^m *Postea Hannibale urgente, Q. Fabio Maximo Dictatore, asses unciales facti: placuitque denarium XVI. assibus permu-
tari, quinarium octonis sestertium quaternis: Ita Resp. dimidiū lucrata est. In militari ta-
men stipendio*

were called *asses sextantarii*, because the *sextans* or sixth part of an ounce was wanting: where-
as ^h *Festus* expressly writes. *Grave æs dictum à pondere, quia deni asses singuli pondo libræ efficiebant denarium ab hoc ipso numero dictum: sed bello Punico populus Romanus pressus ære alieno, ex singulis assibus libralibus senos fecit, qui tantundem valerent.* And these words of *Pliny*, which immediately follow those before recited, put it out of controversy. ⁱ *Whereby*, saies he, five parts were gained, & the debts (of the Common-wealth) discharged. I would gladly see by what *Arithmetick Alciatus* can demonstrate, that the Common-wealth shall gain five parts, making the *asses sextantarii* in his sense; whereas on the contrary, taking them in this interpretation (as both ^k *Agricola*, and ^l *Vallalpandus* doe) it is a thing most evident. For the whole pound, or *assis*, before consisting of XII. ounces, being now reduced to two ounces, and these two passing at as high a rate in the valuation of things vendible, as the vvhole *libra* did, it is plain that the Common-wealth by this diminution of weight, keeping the same constant tenure of the estimation of the *assis*, gained ten parts in twelve, that is, five in sixe; and not one in six, as *Alciatus* would have it. But to omit this digression, and to return to ^m *Pliny*. Afterwards being oppressed by *Hannibal*, under *Q. Fabius Maximus* the Dictator, the *asses* were made unciales, and the *denarius* passed for XVI. asses, the *quinarus* for VIII. and the *sestertius* for IIII. And hereby the Common-wealth gained half, yet in the pay of the Militia the *denarius* was alwaies

accounted for ten asses. The impresse of the *semper denarius* silver [that is, of the denarius] were the bigæ, ^{pro X assibus} and quadrigæ; from whence they are called bigati, ^{datus. Nota} and quadrigati. Not long after by the *lex* ^{argenti fuere} *Papiria* the asses came to be *semunciales*. *Livius* ^{bigæ atque quadrigæ, & inde} *Drusus* Tribune of the people mixed an eighth ^{bigati, quadri-} part of brasse with the silver: thus far *Pliny*. Out ^{gatique dicti.} of which vvords it is most evident (omitting ^{Mox lege Papi-} many passages of his, worth our consideration) ^{ria semuncia-} that as the *denarius* at the first institution pas- ^{les asses facti.} sed for ten asses, so afterwards it vvas valued at ^{*Livius Drusus*} *XVI*. And *Vitruvius* gives a reason why next to ^{in Tribunatu} ten, they made choice of *XVI*. rather then of ^{plebis octavam} *XII*. or any other proportion. ^{partem æris ar-} ^{gento miscuit.} ^{Plin. l. 33. c. 3.} ^{*Vitruv. l. 3. c. 1*} ^{Quoniam ani-} ^{madverterunt utrosque numeros esse perfectos, &} ^{sex, & decem, utrosque in unum conjecerunt, &} ^{fecerunt perfectissimum decussissæxi, where} ^{Bu-} ^{dæus reads decussissæxis: but} ^{*Villalpandus* decus-} ^{si sex, that it may the better, as he imagines, an-} ^{swer to the Greek δ'εξ, ἑξ.} ^{Hujus autem rei,} ^{saith Vitruvius, autorem invenerunt pedem. E cu-} ^{bito enim cùm dempti sint palmi duo, relinquitur} ^{pes quatuor palmorum, palmus autem habet} ^{quatuor digitos, ita efficitur uti pes habeat sex-} ^{decim digitos, & totidem asses æreos denarius,} ^{Metianus also purposely treating of this argu-} ^{ment, after that he had related that the dena-} ^{rius, at the first institution, was valued at ten} ^{asses, adds now it is worth sixteen. And not to} ^{cite more authorities, the impresse or stamp of} ^{*XVI*, as well as of *X* found upon several denarii,} ^{and seen both by} ^{*Antonius Augustinus* (a man} ^{very accurate in coins, as appears by his dia-} ^{logues) and by *Villalpandus*, besides one with the} ^{inscription}

^{*Livius Drusus*}
^{in Tribunatu}
^{plebis octavam}
^{partem æris ar-}
^{gento miscuit.}
^{Plin. l. 33. c. 3.}
^{*Vitruv. l. 3. c. 1*}

^{Budæus l. 5.}
^{de asse.}

^{*Villalp. de*}
^{apparatu Urbis}
^{ac Templi.}

^{*Vitruv. l. 3. c. 1*}

^{*Vol. Metianus*}
^{de assis distrib:}

^{*Anton. August.*}
^{dialogo. 1.}

inscription of *C. Titinius*, with the same character, mentioned by *Fulvius Vrsinus*, and ^c *Dalechamps* in *Plin. l. 33. c. 3* puts it out of controverſie. And this valuation of the *denarius*, as it is more then probable, continued from the firſt institution of it in the ſecond Punick war, without any interruption, to *Juſtinians*' time, and it is likely longer; ſince there is no proof out of any ancient Author, nor any character on any ancient *denarius*, found to the contrary. As for thoſe authorities, which are alleaged, and preſſed by *Budæus*, and *Alciatus*, of *Varro*, *Apuleius*, *Arruntius*, and *Pompeius*, affirming, that after the ſecond Punick war, the *denarius* contained ten *asses*, the *Quinarius*, or *Victoriatuſ* five, the *ſeſtertius* two and an half: we may give a true, and eaſie ſolution, that theſe Writers expreſſed the valuation of them, as they were in their firſt originall, and beginning, with reflection to their primitive denomination: in which reſpect the *Treviri monetales*, or officers of the mint, uſually imprinted on the *denarius* the character X, rather then XVI, the former being the impreſſe of its firſt institution, and the latter of its after valuation. And ſo in like manner may thoſe citations be answered of *Plutarch*, *Dionyſius*, and others, produced by ſome learned men to ſtrengthen their aſſertion, that the *denarius* after the ſecond Punick warre returned to its firſt eſtimation. Which thing could not have been effected, without extreme loſſe, and prejudice to particular men, in their private fortunes, and eſtates; which the juſtice, and wiſdome of the Romane Senate, under the Conſuls, was not likely to have

introduced, or the people to have admitted.

To conclude, the *denarius*, as it is evident by many irrefragable authorities before alleaged, in the highest valuation passed for sixteen *asses*, and according to that proportion the *quinarius*, or *Victoriatas* for eight, the *sestertius* for four: but in the lowest valuation, or first institution, it passed for ten *asses*: and then the proportion of the *quinarius* was five, of the *sestertius* two *asses* and an half, and therefore was thus marked IIS, or thus HS. as the *Quinarius* had this character, V. and also this X, as it is to be seen in a *Victoriatas* of mine own (besides several others) with the face & inscription of *M. Cato*. By which coin that place may not unfitly be explained, which troubled * *Budæus*, why the * *Budæus* li. 1. de *Ordo decussatus*, and *ordo quincuncialis*, signifie in de *asse*. the ranking of trees the same thing, although the *quinarius*, or *quincunx*, give the denomination to the one, & the *denarius*, or *decussis*, to the other. The reason is, because the *Quinarius* had the character X imprinted on it, as well as the *denarius*, or *decussis*. Besides in *Temporarius*, *Cod. MS. Temp. porarii*. wee finde the *quincunx* to bee thus  represented, as the *uncia* thus  so that five of these *uncia* making the *quincunx*, and these five being ranged like the figure X (the character of the *decussis*) it is no wonder if the *ordo decussatus*, and *quincuncialis*, were taken for the same.

That the *denarius* should have passed at any other rate between $\overline{\text{XVI}}$, and $\overline{\text{X}}$ *asses*, as there is no coin extant to prove it, so there is no expresse authority to conclude it. Though some

E infer

⁷ Polyb. l. 2.

infer out of ⁷ Polybius, that it was valued also at XII. asses: because he defines the ἡμισσάειον, or *semissis*, to be τέταρτον μέρος ὀβολῷ, the fourth part of the Attick obolus; and six oboli being in the δραχμή, to which *drachma* they suppose the *denarius* equall, therefore there must be XXIV. *semisses*, or XII. asses in the *denarius*. But with much better reason we may hence infer, that the *drachma* was somewhat bigger, then the *denarius*, as we shall prove in this ensuing discourse; and therefore Polybius allows XII. asses to it: whereas, if it had been precisely equall to the *denarius*, he would have valued it at X, or else XVI. of the lesser sort of asses. So that Sir H. Savile, a man of exquisite judgment, and learning, in his discourse at the end of Tacitus, justly blames Hottoman for altering the text of Polybius, and is himself to be censured, as also ^a Lipsius, in inferring thence that the *denarius* contained XII. asses.

^a Lipsius Ele-
stor. 1. 6. 2.

The severall parts of the *denarius*, excepting the *quinarius*, and *sestertius*, of both which I have spoken before, are all comprized in this description of ^b Varro, with which I shall conclude.

^b Varro lib. 4.
de Ling. Lat.

Nummi denarii decima libella, quod libram pondo as valebat, & erat ex argento parva; sembella quod sit libellæ dimidium quod semis assis. Teruncius à tribus unciis sembellæ quod valet dimidium, & est quarta pars sicut quadrans assis. By which proportions it appears, that the *libella* was the Xth part of the *denarius*, when it vvas currant at ten asses, the *sembella* the XXth, the *teruncius* the XLth. And thus much of the *denarius* as it is *nummus*.

The

The second, and our principall consideration of the *denarius* is as it is *pondus*. In which acceptation it will be necessary to præmise a second distinction; that the *denarius* was either * *Consularis*, or *Cæsareus*. The *Consularis* was that which was made under the government of the City by the Consuls, the *Cæsareus* under the Cæsars: The *Consularis*, (I mean the *Consularis* after the second Punick war, and under the later Consuls) contained precisely the seventh part of the Romane ounce, as the other did the eighth part, or somewhat neerer it.

First, that the *denarius Consularis* of the later Consuls, was the seventh part of the Romane ounce: this shall be our principall inquiry, because it is more evident of the two, and will give us the best light to discover the true weight of the *denarius*, in the notion, and acceptation of the ancients, both Greeks and Latines. It is most apparent both by severall fair coïns, which I have perused of the later Consuls, as also by *Cornelius Celsus*, who lived in the beginning of the Romane Emperors,

* The *Consularis* again may be considered either in the time of the former, or of the later Consuls: that of the former Consuls, at the first institution of it by *Q. Fabius* five years before the first Punick war, *Peireskins* not improbably imagines to have been the sixth part of the Romane ounce: and *Agricola* by comparing it with the *talentum Atticum*, which

Varro values at 15000. *sestertii*, and with the *tetradrachme*, which *Livy* (lib. 34.) estimates *trium fere denariorum*, as also upon the authority of the *Scholiast of Nicander*, who equals the *denarius* to a drachme and an half, as *Priscian* doth to a drachme and a third part, I say *Agricola* assigns to it almost the same proportion with *Peireskins*. But because I have seen no *denarii Consulares* of so great antiquity; and these authorities may perchance admit of other constructions, I shall leave this opinion as onely probable, and follow what is more certain, and demonstrative; of the later Consuls.

before there happened a generall diminution of the *denarius*, that it was then the seventh part of the ounce, who thus writes, ^c *Sed & antea sciri volo in unciâ pondus denariorum esse septem.*

^a *Celsus lib. 5. c.*
17.

^a *Scrib. Largus*
in præfatione.

^a *Plinius l. 33.*
6.9.

The same proportion is also expressed by ^d *Scribonius Largus*, who lived not long after *Celsus*, as some imagine, his words are these. *Erit autem nota denarii unius pro Gracâ drachmâ; æquæ enim in librâ denarii octoginta quatuor apud nos, quot drachmæ apud Gracos incurrunt.* ^c *Pliny* also confirms the same. *Miscuit denario triumvir Antonius ferrum, alii* (he means under the Emperours) *è pondere subtrahunt, cùm sit justum octoginta quatuor è libris signari.* Out of vvhich vvords of his, and of *Scribonius Largus*, it will by a necessary consequence be inferred, that the true weight of the *denarius Consularis* is the seventh part of an ounce. For if we multiply twelve the number of the ounces in the *Romane libra* (as by all it is confest) by seven the number of the *denarii*, of which the ounce then consisted, the sum will be LXXXIII. *denarii*; and so many, say *Scribonius*, and *Pliny*, ought justly to be in the *Romane pound*. And these are the onely cleer, and positive authorities that are to be found in *Classicall Authours*; most of the writings of the *Ancients de ponderibus & mensuris*, having long since been lost; or else those few fragments that are left, of *Cleopatra*, *Dioscorides*, and of others, are so corrupted, that litle truth with any certainty can be collected. From whence it will by way of corollary follow, that if either the *denarius Consularis* be given, the Ro-

mane

mane ounce, and *libra*, in the same proportion will necessarily be thence deduced; or if the Romane ounce, and *libra* be given, the *denarius* will as necessarily be concluded.

But before we farther treat of this argument, we shall indeavour also to demonstrate the *denarius*, by the *drachma Attica*. For *Scribonius* seems, and so doe other ancients, to make them equall. And therefore *Pliny* writes: ^f *Drachma* ^f *Plinius l. 21.*
Attica denarii argentei habet pondus: whereas ^{ca. 34.}
the *drachma Ægina* vvas much larger, this containing $\overline{\text{X}}$. such *oboli* as the Attick contained $\overline{\text{VI}}$. and therefore the *Athenians* in hatred of the *Ægineans* called it $\pi\alpha\chi\epsilon\acute{\alpha}\nu\ \delta\epsilon\alpha\chi\mu\acute{\nu}\nu$, as ^s *Pollux* testifies. And here as we considered the *denarius*, ^s *Inl Poll. l. 9.*
as *nummus*, and as *pondus*; so likewise must ^{c. 6.}
we take the *drachma Attica*, as *nummus*, and as *pondus*: in the prosecution of both vvhich relatively to the *denarius*, I shall insist so much the longer, because it is an argument that hath scarce at all, or very perfunctorily been handled. The *drachma* as *nummus*, vvas a silver coin in use amongst the *Athenians*, (for I intend only to speak of the *drachma Attica*, for the same reason that ^h *Pliny* doth. *Ferè enim Atticà observatione utuntur medici*) and so it vvas the measure of things vendible, as all coins are: and as *pondus*, so was it the measure of their gravity, & weight. Now the *drachma*, as *nummus*, passed in the estimation of the best Authors, both Greek and Latine, at the same rate, and valuation as the *denarius* did. And therefore, as often as the Latines are to expresse the Greek *drachma*, they render it by the *denarius*, and on the contrary, the Greeks the *denari-*

^s Cicer. 16. l. 5.
ep. ad Attic.

^k Dio lib. 45.

^l Plinius lib. 8.
cap. 57.

Hesychius in
voce δηνάριον.

^m Valer. Max:
lib. 6. cap. 6.

ⁿ Strabo li. 5.
Geogr:

o Fragmenta
Cleopatrae.

* A. Gellius
l. 1. c. 8. Noct.
Att.

us by the *drachma*. Thus vvhhat ⁱ Tully renders by the *denarius*, Dio in his 45th book expresseth by the *drachma*. Their words, both speaking of *Augustus*, are these, *Veteranos quique Casilini, & Calatiæ sunt* (as Tully relates) *perduxit ad suam sententiã, nec mirum, quingenos denarios dat.* Καὶ ἔδωκεν εὐδὺς τότε, saith ^k Dio, καὶ πεντακοσίας δραχμὰς. In like manner ^l Pliny writes, *venisse murem ducentis nummis*, (that is, *denariis*; for *nummus* absolutely put is often, though not alwaies, taken for the *denarius*, as on the contrary the *denarius* is taken for *nummus* in *Hesychius*, * δηνάριον τὸ νόμισμα, ἢ εἶδος ἀργυρίου.) *Casilinum obsidente Annibale, eumque qui vendiderat fame interisse, emptorem vixisse annales tradunt.* The same thing ^m Valerius Maximus reports in his 7th book, and 6th ch. and ⁿ Strabo in his 5th book; the former writing that it was sold for 200 *denarii*, and the later that it vvas bought for 200 *drachmae*. To these Authorities I shall adjoin ^o *Cleopatra*. Τὸ Ἰταλικὸν δηνάριον ἔχει δραχμὴν ἓξ. The Italian *denarius* containeth one *drachma*: and * *A. Gellius*, Λαίς μυρίας δραχμὰς ἢ τάλαντον πορῶσцит; hoc facit nummi nostratis, *denarium decem millia*.

These two thus passing the one for the other, being also at the first institution much of the same finenesse in respect of silver; it must necessarily be admitted, either that they were exactly the same for weight, vvhich is our next inquiry, or else that they vv ere not much different. For in comparing of forain coins, the κολλυβίσται, or *numularii*, in ancient times, must have taken the same course, which our most knowing bankers

kers doe practise now. First, to respect the pure-
 nesse, and finenesse of the coins, whither they
 be alike *for the intrinseck*; and next, whither
 they have the same weight; and if they differ
 in either, or both of these, according to those
 differences to proportion their exchanges. Those
 other accidentall causes of the rising, and falling,
 of exchanges of monies, since they are meerly
 contingent, depending upon the necessities, ei-
 ther of times, or places, or persons, I purposely
 pretermit, as not so proper, and essentiall to
 our inquiry. As *for the extrinseck of coins*, by
 which I mean the outward form, or character,
 and inscription of the Prince, or State, though
 this may raise the valuation of them in those
 Countries, which are subject to the Prince, or
 State, and lessen them in those which are out
 of their dominions; yet this can produce no
 remarkable difference, more then what is usu-
 ally assigned by the Masters of the Mint, for
 the wast in coining, and for the labour of the
 vwork.

With these cautions if we shall examine the
 Attick *drachma*, and by such writings of the An-
 cients, or by such coins as are extant, inquire
 their true weight, we shall come to such a pre-
 cisenesse, as may be hoped for in a work of this
 nature. P *Suidas* tels us in the generall, *δραχμή* ^{P Suidas in vo-}
 ὅ ἐκ τῆς νομίσματος ἀργυρίου. *The drachma is the* ^{ce δραχμή.}
weight of the silver money. And q *Hesychius* more ^{q Hesychius in}
 particularly informs us. *Δραχμή τὸ ὄγδοον τῆς ὀν-* ^{voce δραχμή.}
γίας, The drachma is the eighth part of the ounce:
 and r *Fannius* yet more distinctly writes, ^{r Rbenn. Fann.}

*In scrupulis ternis drachmam, quo pondere doctus
Argentifacilis signatur pondus Athenis.*

¹ *Fragmenta
Cleopatæ.*

To which vve may adde ¹ *Cleopatra*, Ἡ Δραχμὴ
ἔχει τρεῖς μέρη γ'. ὀβολὸς ε'. τετράς θ'. κερὰ π. ιη'.
χαλκὸς μί. The drachme hath three scruples, sixe
oboli, nine lupini, eighteen siliqua, forty eight are-
ola. The ² *Scholiast* of Nicander also makes the
διδραχμὸν to be τὸ τέταρτον τῆ ἑξῆος, the fourth
part of the [Attick] ounce. In the same propor-
tion are we to take those other silver Athenian

³ *Iul. Poll. l. 9.
c. 6.*

coins mentioned by ⁴ *Iulius Pollux*, namely, the
τρίδραχμον, which consisted of three drach-
mes, the τετράδραχμον, or τέτραχμον, which
by a Syncope, is the same with the τετρά-
δραχμον, containing foure drachmes, or the
half ounce. Τέτραχμον, τετρεῖς δραχμῶν, saith ⁵ *He-*

⁵ *Hesychius* in
voce τέτραχ-
μα.

sychius; though ⁶ *Ammonius* puts a distinction
between them, τέτραχμον ἢ τρεῖς τριτάτων δραχμῶν [ἄξιον]. This

⁷ *Ammonius*
περὶ ὁμοίων καὶ
διαφόρων λέξε-
ων.

the Greeks also called στατήρ, as ⁸ *Cleopatra*, and
⁹ *Epiphanus* witnesse. Ὁ στατήρ, in *Cleopatra*,

⁸ *Fragmenta
Cleopatæ.*

ἀγχι ς' δ'. καὶ π. ἢ αὐτὸν τετρεῖς δραχμῶν: the stater
weighs four drachmes, this they call the tetra-

⁹ *Epiphanus*
περὶ σταθμῶν.

drachme. And this also may most cleerly be

¹⁰ *Matth. ca. 17.
v. 24.*

collected out of ¹¹ *S. Matthem*, where seeing the

original expresseth it more fully then our tran-
slation, I shall recite the vvords as they are in the

Greek. Ἐλθόντων ἡ αὐτῶν εἰς Καπρναῦμ, προσήλθον
οἱ τὰ διδραχμα λαμβάνοντες τῷ Πέτρῳ, καὶ εἶπον,

ὁ διδάσκαλός ὑμῶν ἔτελει τὰ διδραχμα; which
the Vulgar renders thus, Et cum venissent Caper-

naum, accesserunt, qui didrachma accipiebant, ad
Petrum, & dixerunt ei, Magister vester non sol-

vit didrachma? and our Translation thus, And
when

when

when they were come to Capernaum, they that received tribute money, came to Peter, and said, Doth not your Master pay tribute? In the 27th verse of the same chapter, our Saviour answers.

ἵνα μὴ σκανδαλίζωμεν αὐτοὺς, πορεύθεις εἰς τὴ θάλασσαν βάλε ἄγκυσσον, καὶ τὴ ἀναβαίνοντα πρῶτον ἰχθύν ἄρον, καὶ ἀνοίξας τὸ στόμα αὐτοῦ, ἐυρήσεις σαττήν. ἐκείνον λαβὼν δίδς αὐτοῖς ἀντὶ ἐμοῦ καὶ σοῦ. Notwithstanding, lest we should offend them, goe thou to the sea, and cast an hook, and take up the fish that first cometh up: and when thou hast opened his mouth, thou shalt find a peece of money: that take, and give unto them for me, and thee. This, which our Translation calls tribute money, in the 24th ver. is called in the originall δίδραχμον, or two drachmes, & so much was paid by the pole, according to ^d Josephus, for each particular person. Our Saviour therefore paying for himself and S. Peter, in the 27th verse, bids him to give a stater, that is, a τετράδραχμον, or four drachmes, namely, the double to the δίδραχμον, which our Translation renders too generally by a peece of money: But the ^e Persian Translation interprets it distinctly by four drachmes.

^d Josephus li. 7. bell. Ind. c. 27

^e Evangelia Pers. MSS. E. ruditissimi Viri D. Pocockii.

چهار درم سرو بیایبی اندرا بیاور
 Thou shalt finde four drachmes in it, that take, and give for thee, and me.

With this Attick tetradrachme, or silver stater, the Hebrew, and Samaritane שֶׁקֶל shekell, that is, sicle, did also agree. For if we give credit to Iosephus, who in ^f Scaligers esteem is, Diligentissimus καὶ φιλαληδέστατος omnium scriptorū, we shal finde them to be the same. & ὁ οἰκλος νόμισμα

^f Scal. ἀπολογ. in libr. de Emend. Temp.

^g Iosephus l. 3. antiq. Iudae.

ἑβραίων

Philo de decalogo.

Hesychius in voce σίκλος.

Hieronym. in Ezek. 3.

** Such sicles, I conceive, were those*

ἑβραίων ὧν Ἀπικὰς λέχεται δραχμὰς τέσσαρες. *The sicle is a sort of money amongst the Hebrews, that contains four Attick drachmes. The same proportion is evidently collected out of ^h Philo, where for L. shekels mentioned in the Law he renders CC. drachmes, and for XXX. an hundred and twenty. ⁱ Hesychius likewise testifies as much, σίκλος τετραδραχμων Ἀπικόν, the sicle is [in valuation] the Attick tetradrachme: and ^k S. Hierome, the ablest of the Fathers in the Jewish Antiquities, * Siclus, id est stater, habet quatuor drachmas Atticas.*

τείακοντα ἀργύρια, the XXX peeces of silver, which were given to Iudas, as the reward of his treason. Eusebius relating the story expressly, terms them silver staters, which an Hebrew would have termed either silver shekels, or absolutely שֶׁקֶל cesel: this in the Scripture phrase being frequently put for the shekel, and therefore the Syriack Translation of the New Testament reads it נֶשֶׁקֶל; Whence Tremellius hath this annotation. *Observant Hebræi, ubicunque in Scripturis argentorum fit mentio, non expressâ numismatis argentei specie, intelligi siculum sanctuarii equivalentem quatuor denariis.* Some modern Writers imagine them to have been but XXX. denarii; But Baronius contends that they were, *vel librarum argenti XXX, vel aureorum coronatorum trecentorum:* And Arias Montanus, that they were either XXX librae, or XXX. talenta. The most probable opinion is, that this sum was neither so great as Baronius, and Montanus make it, nor yet so little as some Moderns would have it, but between both, and that is XXX. shekels. M. Casaubone in his Exercitations upon Baronius hath a probable conjecture to strengthen this assertion. *Non enim temere factum videtur, quod filius Dei qui sese exinanivit, assumptâ servi formâ, Phil. 2. 7. triginta argenteis venderetur, sicut lege Dei mancipia totidem sicles aestimantur. Exod. 21. 32. & apud Iosephum lib. IV. c. VIII. Facit hoc quoque non parum ad Domini abjectionem declarandum, quando caput ejus tam parvi aestimatum est.* A small price I confesse, XXX. shekels being lesse then XV. of our ordinary crowns: But Hierome upon Saint Matthew thought it to bee as litle, who thus writes, as M. Casaubone renders him, *Infelicem Iudam non cogitasse quanti pretii rem venderet. sed Christum mundi Salvatorem, Dei filium, cen vile aliquod mancipium minimo pretio addixisse.* Now the price of a servant we finde in Exodus to have been XXX. shekels.

These

These testimonies are so positive, and from so good Authors (to which also I might adjoin ¹ Epiphanius in his book *περὶ ὑπομνήων*, did I not conceive him to be full of errors in that discourse), that I cannot sufficiently wonder at that strange opinion of ^m Græpseus, and some others, introduced out of affectation of novelty, of a double shekel, the one sacred, equall to the tetradrachme, the other prophane, weighing the didrachme: that used in the Sanctuary, this in civill commerce, without any solid foundation in the writ, or without any probability of reason, that in any wise State, the Prince and people should have one sort of coin, and the Priests should have another: and that this of the Sanctuary should be in a double proportion to the other, and yet that both should concur in the same name. It is true there is often mention in the ⁿ Scriptures of the *weights of the Sanctuary*, not as if these were different from what were used vulgarly in the City; but because the Standards, and originals, the rules of commutative justice, and therefore of an high and sacred use, were kept (as it is more then probable) in the Sanctuary; For God himself makes this one of the Priests offices, *ut sint super omne pondus atq; mensurā*. And it is no wonder that God, who so much hated a *false balance*, and a *false measure*, should commit the charge of these to the Priests, as things most holy; since the Heathens themselves out of a reverent estimation of them, placed them in their temples, as appears by that inscription of the *congrus* of Vespasian before alleaged, and now ex-

tant

¹ Epiphanius
περὶ ὑπομνήων.

^m Græpseus de
multiplici siculo,
& *talento*.

ⁿ And all thy
estimation
shall bee ac-
cording to the
shekel of the
Sanctuary.
Levit. 27.25.
Vet. vulg. siculo
Sanctuarii pon-
derabitur.
^o *1 Paral. 23.29*
^p *Prov. 11.1.*
tem cap. 20.
ver. 10.23.

¶ Rhemn: Fanx.
carmina de
pond. & men-
suris.

tant in Rome; and by these verses of ¶ Fan-
nius, treating of the Romane measures,

*Amphora fit cubus, quam, ne violare liceret,
Sacravere Iovi Tarpeio in monte Quirites.*

¶ Authentic.
collat. 9. de col-
latoribus tit. 11.
novel. 128. c. 15

And afterwards in the times of Christianity they were kept in Churches, as it is to be seen in the ¶ Authenticks of Iustinian; where he commands, that the weights and measures should be kept, in *sacratissimâ cujusvis civitatis ecclesiâ*, As for those allegations taken out of the interpretation of the LXX. whereby Grsepsinus, and others goe about to prove a double shekell, they are all well, and solidly, in my judgement, answered by ¶ Villalpandus, and others, to whom I shall refer the judicious Reader. For I intend not here to speak of the Hebrew shekel, or Attick drachme, more then what may serve to illustrate the *denarius*.

¶ Villalp. de ap-
par. urbis ac
templi par. 2.
lib. 2. disp. 4. c.
28. Item par.
2. li. 2. disp. 4.

Seeing therefore, as we have proved, that the Attick *drachma* was equall in the notion, and acception, of the Ancients, to the *denarius*: if therefore an intire, either Attick *δραχμή*, or *δίδραχμον*, or *τετράδραχμον* were found, wee might thence conclude the *denarius*. Again, since the Hebrew shekel hath likewise been demonstrated to be equall to the Attick *τετράδραχμον*, and this Attick *τετράδραχμον* to four *denarii*, by the common, and received * axiome of Geometricians, we may conclude, that the Hebrew shekell was also equall to 4 *denarii*, that is, that 4 Romane *denarii*, the Attick *τετράδραχμον*, and the Hebrew *שקל* were all respectively equall to one another. If therefore an Hebrew shekel, fair, & intire, were found, we might as necessarily thence

* Quæ eadem
æqualia sunt
æqualia inter se.
Encl. ar. 1. l. 1.

thence infer the *denarius*, as by the *τετράδραχμον*.

We shall endeavour by both these to inquire out the truth, and first by the Attick tetradrachmes in silver: because of these I have seen, and weighed many, some of them very fair, and perfect, and found at many severall places, as *Athens*, *Constantinople*, *Tenedos*, and other parts: where the art of counterfaiting coins is not as yet crept in, and where it is to little purpose to practise it: seeing in those places there are few so curious as to buy them, or that will give a greater valuation, then what they are worth in the *intrinseck*. Wherefore having in *Italy*, and elsewhere, perused many 100 *denarii Consulares*, I finde by a frequent, and exact triall, the best of them to amount to *LXII*. grains English, such as I have carefully taken from the Standards of the Troy, or silver weights, kept in the Tower in *London*, and in Goldsmiths Hall, & in the Vniversity of *Oxford*: on the other side weighing many Attick *tetradrachmes*, with the image of *Pallas* on the fore part, and of the *noctua* on the reverse. I find the best of these to be *CCL XVIII*. grains, that is, each particular drachme *LXVII*. grains.

And that no man may doubt whither these were true *Athenian tetradrachmes*, we are to observe, that the Ancients used severall impresses on their coins, by which they might be known, and distinguished. And therefore *argentum signatum*, in the description of *Quintius* his triumph over *Philip*, is by *Livy* opposed to *argentum infectum*, which *Pollux* terms *ἀσσημένον*, as *Tully* calls the former sort *factum*, atque *signatum*, and the *Greeks* *ἐντετυπημένον*. Thus

Livius l. 34.
Jul. Poll. l. 9.
 c. 6.
Cicer. 6. *Verr.*
Jul. Poll. l. 9.
 c. 6.

the

^e Liv. l. 34.

^a Plinius l. 33.
ca. 3.

^{*} Plin. ib.

^b Plutarchus in
Artaxerxe.

Τὸ ὃς Περσικὸν
νόμισμα τοξί-
την ἐπίσημον
ἔχει.

^{*} Plut. Agesil.

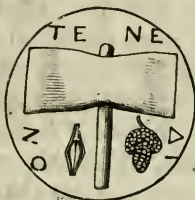
^{*} Virg. l. 1. A-
neid.

^e Jul. Poll. l. 9.
c. 6.

^{*} Heraclides
περὶ πολιτε-
ῶν.

the *denarius* had the impresse of the *biga*, or *quadriga*, as *Pliny* informs us: and therefore ² *Li-
vy* uses the word *bigati* for *denarii*, & ² *Pliny* both
bigati and *quadrigati*. The brasse coins of the Ro-
manes were thus marked. ^{*} *Nota aris fuit ex alte-
râ parte Ianus geminus, ex alterâ rostrum navis,
in triente vero & quadrante rates.* The *Perfi-
ans* stamped on the reverse an ^b archer: vvhich
occasioned that conceit of *Agésilas*, mentioned
by ^{*} *Plutarch*, that the King of Persia had
beaten him back with ten thousand archers,
when with so much mony he had corrupted the
Grecians. The *Carthaginians* on the one side
signed the face of a woman, (I suppose in
memory of Queen *Dido*) on the reverse the
head of an horle, or in *Virgils* expression ^{*} *ca-
put acris equi*, both vvhich I have seen. The
Peloponnesians had the impresse of a tortoise on
their mony, whence that witty Greek proverb
took its originall. ^c *Τὸν ἀρετὴν, καὶ τὴν σοφίαν νε-
χῆναι χαλῶναι.* The mony at *Tenedos* had on the
one side a double hatchet, and on the other
side two heads, one of a man, and another of
a woman, arising from the same stemme, or neck,
in memory of a Law made by the King of that
Island (whom ^{*} *Heraclides* names *Τέννης*, placing
him ancients then the *Trojan* war), that a man,
and a woman, taken in adultery should have
their heads struck off vwith an hatchet. In
which kind I met with two very rare, and an-
cient coins in silver, at *Constantinople*, both made
vwith a very fair relevy, and both agreeing in
the same image, and inscription: the one
weighed lesse then the Attick *tetradrachme*, the
other wanted somewhat of the *drachme*. And
because

because the coin hath not, I think, been seen by any Antiquary, and the history is remarkable, I shal here express the figure of the fairest of these.



And the history I shall relate out of ^d *Heraclides* ^e *Heraclides*. Νόμον δέ τινά φασι τῷ βασιλεῖ Τέννην δια- ^ω *τὴν πολιτείαν* θέσθαι, εἴς τις λάβοι μοιχὸν ἀποκτείνην τῆτον πελέκῃ. ἀλόντος ὃ τῷ υἱοῦ αὐτοῦ, καὶ τοῦ λαβόντος ἐρομένε τῷ βασιλεῖ τί χρὴ ποιεῖν, ἀποκρίνασθαι τῷ νόμῳ χρῆσθαι. καὶ διὰ τοῦτο τοῦ νομίσματος αὐτοῦ ὅτι δάτερα πέλεκυς κεχάρακται, ὅτι δάτερα ὃ ἕξ ἐνὸς αὐχένῳ πρόσωπον ἀνδρὸς καὶ γυναῖκος. καὶ ἐκ τέττε λέγει ὅτι τῷ ἀποτόμων, τὸ ἀποκακόφθαι Τενεδίῳ πελέκει. They say King Tennes made a law, that if one took another in adultery, he should kill him with an hatchet. His sonne being found so, and he that took him, asking the King what he should do, he answered execute the Law: and for this reason of one side of his money there was an hatchet imprinted, on the other the face of a man, and of a woman, arising out of one neck. From hence is it said of severe actions, to be cut with a Tenedian hatchet. For vvhich exemplary justice those of Tenedos, as it is probable, deified King Tenes. ^e Tully writes, Tenedi Tenem [Deum appellant]: ^e Cicer. libr. 3. and again, ^f Tenem apud Tenedios putant esse sanctissimum ^{rum}.

Etissimū Deum, ac eorū Urbem condidisse. Where his name is truer writ thē in *Heraclides*. For the coin hath onely a single N. and so hath * *Eustathius*.

*Eustathii πα-
ρεβόλαις
τὴν ἀράφωδ.
λιαδ.
¶ Herodot. in
vita Homeri.*

The mony of *Chios*, as *Iulius Pollux* witnesses, had the effigies, or resemblance, of *Homer*: no doubt in honour of his memory; though § *Herodotus* relates, that whilst he vvas living he found at first but cold entertainment in that Island. *Thesens* the tenth King of the *Athenians* signed his mony with the impresse of an ox; hence that proverb βοῦς ὅπῃ γλώσῃ βέβηκεν. This as ^h *Iulius Pollux* testifies was the δίδραχμον: vvhof farther adds, τὸ ὃ παλαιὸν τοῦτο ἦν Ἀθηναίοις νόμισμα, καὶ ἐκαλεῖτο βοῦς ὅπῃ βοῦν εἶχεν ἐντετυπωμένον. εἰδέναι ὃ αὐτὸ καὶ Ὅμηρον νομίζουσιν εἰπόντα, ἐκατόμβοι ἑννεαβοίων. καὶ μὲν καὶ τοῖς Δράκον-
τῳ νόμοις ἔστιν ἀποτρίνῃν δειράβοιον, καὶ ἐν τῇ παρὰ
Δηλίας θεωρίᾳ τὴν κήρυκα κηρύττειν φασὶν ὁπότε δωρε-
άν πινι εἰδίδοτο, ὅτι δοθήσονται αὐτῷ τοσούτοι βόες,
καὶ δίδραμαι καθ' ἕκαστον βοῦν δύο δραχμαὶ ἀπληγές.
This was an ancient coin amongst the *Athenians*, and was called βοῦς, because it had the figure of an ox instamped. They imagine that *Homer* knew this, when he said, ἐκατόμβοι ἑννεαβοίων, ¹ and also in the laws of *Draco*, it is to pay the mulct of ten oxen. And they say, that at the solemn shew at *Delos*, the crier when any gift is to be given, cries so many oxen shall be given, and for every ox so many *Attick* didrachmes are given. The same
¶ *Iul. Poll. ibid.* ¹ Author writes, that the *Attick* tetradrachme was stamped vvhith the face of *Minerva*, and he might have added with the noetua on the reverse. This * *Eubulus* pleasantly calls παλλάδι-
πῶλον *Minervæ pullum*. The Διδράχμον had the
face

^b *Iul. Poll. l. 9.*
6.6.

¶ *Iul. Poll. ibid.*

* In *Anchise*.

face of *Jupiter*, it may be it is an error in *Pollux*, for *Pallas*, and on the other side the *noctua*. The *περὶ βολον* had on the one side *Jupiter*, according to * *Pollux*, (I conceive it to be a mistake for *Pallas*, or *Minerva*) on the other side two *noctua*, because it was the double to the *διὰ βολον*. From the *diobolū*,^k *Plautus* uses the term *diobularis Servorū*^k *Plautus in Pænulo.* *Sordidulorum*, *Scorta diobolaria*, which^l *Festus* interprets thus, *meretrices diobolares appellatas, ex eo quòd duobus obolis ducerentur.* To which I may adjoin, out of such ancient coins as I have seen, that the *triobolum* (whence that phrase of^m *Plautus*, *homo trioboli*, and of the Greeks *ἀξιοτριωβόλος*) which byⁿ *Pollux* is called the *ἡμίδραχμιον*, had the face of *Pallas* on the one side, and the *noctua* on the other; and so likewise had the *obolus*, and *diachma*, of such as I perused, and all of them on the reverse the inscription *ΑΘΕ*. And I think I may safely add, that on such coins as we finde the *noctua*, with a deep relevy, we may conclude them to be *Athenian* coins. ° *Plutarch* ° *Plutarchus* is of the same opinion in the life of *Lysander*, in *Lysandro*: where he discourses of *Gylippus* a Commander, as famous for defeating the *Athenians* in *Sicily*, as infamous for stealing the silver consigned to him by *Lysander*, for the city *Sparta*. When he arrived, saith *Plutarch*, at *Sparta*, he hid the silver that he had stoln under the tiles of his house, and delivered into the hands of the *Ephori* the bags, shewing them the seals [intire]: Which being opened, and the money told, they found the sums to disagree from the labels: wherewith being troubled a servant of *Gylippus* in obscure tearms intimated to them, That under the tiles of his Masters

house there were hid many *noctua*, or owles; ἂν γὰρ (ὡς ἔοικε) τὸ χάραγμα τῶ πλείεστε τότε νομίσματα, διὰ τοὺς Ἀθηναίους γλαῦκες. For the greatest part (as it seems) of the money then had the stamp of the *noctua*, by reason of the Athenians: who not long before, as *Thucydides*, and the best Historians of those times shew, were the richest, and most flourishing State amongst the Grecians.

Having therefore had the opportunity to have bought, or else the favour to have weighed many fair, and perfect Attick tetradrachmes, found at remote places, with the *Pallas galeata* on the one side, and the *noctua*, vvith the inscription AΘE on the reverse, where E being placed for H proves the antiquity of them. (For the Atticks at the first used not H, but onely E, for both E and H) I finde by the best of these (to reassume what I said before) that the Attick tetradrachme is 268 grains, and the drachme 67 of our Troy, or English standard. Which may farther be confirmed by an Attick drachme of mine own, found in the *Black Sea*, vvith this inscription, AΘE TINAPNIKA APXE, and by a * τριώβολον, or semidrachme bought by me at *Alexandria*: that weighing neer 66 grains, and this 30 and better: the face of *Minerva*, either by use, or time being a litle diminished in both: but yet so litle, that they cannot have lost above two or three grains of their primitive vveight. And as this single Attick drachme of mine is much to be valued by Antiquaries for the vveight, and therefore vv as desired by the learned *Peireskius*: so is the inscription

TI-

* I have since perused a fair Athenian τριώβολον of my very worthy, and learned friend, *John Marsham* Esquire, weighing completely 33 grains English. As also another of *Sir Tho. Roes*, together with an ὀβολός of his, weighing 11 grains.

TINAPNIKA APXE no lesse vworth consideration, for the explication of a place in *P. Livy*: who *P. Livius l. 37* describing the naval triumph of *L. Aemilius*, vvrites thus, *Pecunia translata nequaquam tanta pro specie regii triumphi, Tetracina Attica CCXXXIII. millia, Cistophori CCCXXII. mil.* Where *q. Budaus*, and *Rhodiginus* in stead of *q. Bud. lib. 2. de tetracina*, read *tetradrachma*. *Tetracinum enim asse. quid sit, nemo ut arbitror novit*, saith *Budaus*: *Rhodigin: lect: antiq. l. 10. s. 2.* I vvould rather read it, as the coin doth, *Tinar-nica*: this having almost the same letters vvith *Tetracina*, vvhich by the Scribes, I suppose, have been inverted. Neither is there any reason, why *Livy* might not as vvell mention in this triumph, *Attica Tinarnica*, as *Tetradrachma*; these being the fourth part of the tetradrachme, and therefore better agreeing with his description: *Pecunia translata nequaquam tanta pro specie regii triumphi*: and also better agreeing vvith the *Cistophori* he here mentions: a sort of coin about half of these *Attica Tinarnica*, where-as the *tetradrachma* were eight times as great. For *Festus* expressing the *talentum Euboicum*, *q. Sextus Pompeius Festus de Verbi signif.* renders it by 7500 *cistophori*, and by 4000 *denarii*, or Attick drachmes, that is, c^l₅. tetradrachmes. *Euboicum talentum nummo Graco septem millium & quingentorum cistophorum est: nostro quatuor millium denariorum.*

And as these testimonies above alleaged are beyond all exceptions, so the gold coins of the Grecians, which I have examined, doe most evidently prove this proportion assigned to the Attick drachme. Which that vvee may the better understand, vve are to observe vvhat pro-

portion the valuation of the gold of those times had to the silver; and next, vvhhat proportion it had in respect of weight.

¹ *Iul. Poll. l. 9.*
E. 3.

² *Scholias-
tes A-
ristophanis.*

For the first, ¹ *Iulius Pollux* in very perspicuous terms, puts it down, Τὸ ὃ χρυσίον ὅπ τοῦ ἀργυρίου δεκαπλάσιον ἦν παρῶς ἂν τις ἐκ τῶ Μενάνδρου παρακαταθήκης μάθῃ. That the gold was in a ten-fold proportion to the silver one may evidently learn out of Menanders' paracatathece. ² The Scholiast of *Aristophanes* implies as much. Εἰς ἃ χρυσὶ πατῆρες οἱ Δαρεικοί. ἐδύνατο ὃ ἕκαστος αὐτῶν, ὅπερ ὁ παρὰ τοῖς Ἀθηναίοις ὀνομαζόμενον χρυσῶς, ἐκ ἀπὸ Δαρείου τοῦ Ξέρξου πατρὸς ἀλλ' ἀπὸ ἑτέρου πινὸς παλαιότερου βασιλέως ὀνομασθήσαν. Λέγουσι δὲ πινες δύνασθαι τὸν Δαρεικὸν δεκαχμᾶς ἀργυρίου εἶκοσιν. ὡς τὸς πέντε Δαρεικὸς δύνασθαι μινᾶν ἀργυρίου. The Darics are golden stuters, each of them is worth as much as that which is named by the Atticks the χρυσῶς. They are called so not from Darius the Father of Xerxes, but from another King more ancient then hee. Some say that the Darick is valued at XX. drachmes of silver, so that V. Darics are worth a mina of silver. For the Attick μινᾶ, or mina, containing an hundred drachmes in weight, as it is very cleer out of ^a *Pliny*, ^{*} *Pollux*, and others. *Mna* (saith *Pliny*) *quam nostris minam vocant, pendet drachmas Atticas centum.* And *Pollux*, Ἡ μινᾶ ὃ παρ' Ἀθηναίοις ἕκατὸν ἔχει δραχμᾶς Ἀθηναίους: The mina with the Athenians containeth an hundred Attick drachmes, and the χρυσῶς Δαρεικός, or πατὴρ χρυσῶς of *Darius*, consisting of two drachmes in weight, as vve shall presently prove, it vwill necessarily follow that the proportion of the δραχμὴ χρυσία, was

to

^a *Plinius l. 21.*
c 34.
² *Iul. Poll l 9.*
E. 3.

to the δραχμὴ ἀργυρία, in *decuplâ ratione*: and therefore that five Daricks, or ten drachmes of gold, were equall in valuation to an hundred drachmes in silver, that is, to the μνᾶ. The same proportion may be collected out of ¹ *Polybius*, ¹ *Polybii ἐκλε- γαι-πρὸς πρεσ- βειῶν* ca. 28 *Ex biblioth. Fulvii Vrsini. Antv.* 1582. ² *Livius l. 38.* ³ *παρὰ τῷ τοῖς Ἑλλήσιν κ' δραχμῶν τὸ χρυσὸν ἀλλά- ττεται νόμισ- μα. Zonaras.* ⁴ *Hesychius in voce δραχμή.* ⁵ *Suidas in voce δραχμή.*

when the Romanes upon a summe of money to be received, concluded a peace with the *Ætolians*. Ἀντὶ τρίτῃ μέρεος τοῦ ἀργυρίου χρυσίον, χρυσίον εἰς βέλων διδόντες τῷ δέκα μνῶν ἀργυρίου, χρυσίον μνῶν. Which words ² *Livy* renders thus. *Pro argen- to si aurum dare mallent, dare convenit, dum pro argenteis decem aureus unus valeret.* This being granted, is certainly of necessity it must, I would correct that place of ³ *Hesychius* concerning the δραχμὴ χρυσία, and read it thus, δραχμὴ ὅ χρυσία ὁλκὴ νομίσματος εἰς ἀργυρίου λόγον δραχμῶν ἑ' & not διδραχμῶν ἑ'. as it is in the printed copies. And by this of *Hesychius* I would supply the defect of *Suidas*, who writes. δραχμὴ ὅ ὁλκὴ νομίσματος εἰς ἀργυρίου δραχμῶν ἑ' and make it thus, δραχμὴ ὅ χρυσία ὁλκὴ νομίσματος εἰς ἀργυρίου λόγον δραχμῶν ἑ'. For without the addition of χρυσία, and λόγον, there is no sense: And I beleieve *Suidas* took these very words out of *Hesychius*.

Having thus found the proportion that the δραχμὴ χρυσία had to the silver, our next inquiry is, how many of these drachmes in weight the χρυσός, or χρυσός στήρ, or *aureus* contained. ⁶ *Iulius Pollux* gives us in this particular the best, and most positive information of any, ὁ ὅ χρυσός στήρ δύο εἶχε δραχμῶν Ἀττικῶν. The golden *stater* [or *aureus*] contains two *Attick* drachmes. The same is confirmed by ⁴ *Hesychius*: Πολλέ- ⁴ *Hesychius in voce χρυσός.* μαρχος φησὶ δύνασθαι τὸ χρυσὸν παρὰ τοῖς Ἀπικοῖς

δραχμῶν δύο· ἢ ὃ τῷ χρυσῷ δραχμὴν νομισμα-
 τος ἀργυρίου, δραχμῶν δ' ἓνα. *Polemarchus* saies that
 the aureus amongst the Athenians contains two
 drachmes, and that the drachme of gold is worth
 ten drachmes of silver. And to this of *Pollux*
 and *Hesychius* all the aurei of the ancient
 Grecians, which have passed through my hands,
 doe very well correspond. Now these aurei as
 they had severall impresses upon them, so had
 they severall names, by which they are distin-
 guished. For they were either Ἀθηνοὶ, or Δα-
 ρεικοὶ, or Φιλίππειοι, or Ἀλεξάνδρειοι, or the like,
 all which we may prove by *Xenophon*, * *Harpo-*
cratio, the *Scholiast* of *Aristophanes*, and others,
 to have been equall unto two Attick drachmes,
 and therefore respectively equall to one ano-
 ther. Neither is this much to be wondred at,
 that the Grecians, and Persians, though at enmi-
 ty amongst themselves, yet should agree in the
 aurei; seeing that in our times, the Venetian
 Chequeen, the Barbary Ducat, the Ægyptian,
 and Turkish Sherif, are almost all of the same
 purenesse in respect of the gold, and not differ-
 ring above a grain in the weight. Which differ-
 ence we may also allow to those of the An-
 cients, without any prejudice to our inquiry.
 Concerning these aurei, or golden staters, the
 observation of *Julius Pollux* is worth our con-
 sideration, Καὶ οἱ μὲν Δαρεικοὶ ἐκάλουντο σατῆρες,
 οἱ δὲ Φιλίππειοι, οἱ δὲ Ἀλεξάνδρειοι, χρυσοὶ πάντες ὄν-
 τες, καὶ εἰ μὴ χρυσοὶ εἴποις περὶ πάντας τὸν σατῆρα, εἰ δὲ σατῆρ
 εἴποις ὁ πᾶν τὸν χρυσοῦς. Of the staters some were
 denominated from Darius, some from Philip, some
 from Alexander & were all of gold. And when you say
 the

* Λέγουσιν δὲ
 τινες δύνασθαι
 ἢ Δαρεῖκον
 ἀργυρίου
 δραχμῶν κ' (as
Ios. Scaliger
 rightly corrects
 the printed co-
 pies, which ren-
 der it ἡ or ὁκ-
 τῶ) ὡς τὸς
 πέντε Δαρεῖκὸς
 δύνασθαι μίαν
 ἀργυρίαν. *Har-*
poer. Τριχίλι-
 οὶ Δαρεῖκοὶ
Xenophonti
 sunt ἀργ. τάλ-
 λαντες. *Talen-*
tum autem 600
drachmæ. Ergo
 Δαρεῖκὸς sunt
 20. drachmæ.
Scal. de re num.
 * *Iul. Poll. l. 9.*
 c. 6.

the aureus, the stater is understood, but if you say the stater, the aureus is not always meant. And this is most true; for the χρυσῆς, or aureus (I speak not here of the aureus Romanus, this being somewhat lesse then these mentioned by Pollux) did alwaies imply the σάτρη, but the σάτρη did not alwaies infer the aureus: the stater being more generall, signifying as well the argenteus, as the aureus, and that was double to this; the stater argenteus being four drachmes, as we proved before, and therefore the same with the tetradrachme, & the aureus two drachmes, and therefore equall in weight to the didrachme. Wherefore every aureus was rightly called a stater, but every stater could not rightly be called an aureus.

From these aurei then, or χρυσοὶ σάτρηες, we may deduce the silver Attick drachme, if we either had the Δαρεικοὶ, some of which to this day are found in Persia, or if we had the Φιλιππειοί, or the Ἀλεξανδρειοί. To passe by the Δαρεικοί, because I have not perused any of them, and to speak onely of the Φιλιππειοί and Ἀλεξανδρειοί, of which there are many extant.

Concerning the Φιλιππειοί * Snellius writes thus: *Philippi nummum unicum, & Alexandri Macedonum, solertissimus veterum nummorum estimator Nicolaus Rockoxius possidet, utrumque eodem ponere granorum 179.* Now CLXXIX. grains of gold in Holland, such as Snellius used, are answerable to an hundred thirty four grains English and an half. Neer vvhich proportion I have observed two others, with the inscription ΦΙΛΙΠΠΟΥ, excepting onely a grain, or two.

As for the Ἀλεξανδρειοί, I finde the weight of

one of the fairest for impression, and character, I think in the world; which I bought at *Alexādia*, with the image, and inscription ΚΛΕΞΑΝΔΡΟΥ , to be exactly of English grains $133\frac{1}{4}$, and another at *Constantinople* 133 , and in the same proportion severall others. With which comparing one of mine honoured and learned friend *Iohn Maishū* Esquire, I find his a grain defective: And weighing since some others out of that choice, & rare $\kappa\alpha\mu\acute{\eta}\lambda\iota\omicron\nu$ of ancient coins collected by the noble Sir *Simonds D'Ewes*, Knight Baronet, I observed two of his to exceed 133 by $\frac{1}{2}$ a grain. Wherefore I may conclude (allowing onely half a grain for so much wanting by time, or by the mint) from the *aureus* being double to the Attick drachme, that it hath been rightly assigned by me to be LXVII . grains; And from this with those limitations above mentioned I may conclude the *denarius Consularis*, (which is our principall inquiry) seeing *Galen li. 8. c. 3. de compositione Medicam*: according to the Latine manner of division), speaking of an antidote prescribed by *Asclepiades*, whereof the dosis was to be one drachme, or *denarius*, writes thus. $\text{Ηγούμαι ὅτι λέγειν αὐτὸν δραχμὴν ἀργυρᾶν, καὶ γὰρ ἔγωγε δὲδὼν ἅπασιν τοῖς νεωτέροις ἰατροῖς ἕδος ὀνομάζειν. ἄλλοι δὲ νοεῖν ἡμᾶς ἐδὲν ἢ τῆ πεντάγματο φύσιν ἀναγράφει. πρὸς δὲ αὐτὸν δὲ ὅτι δραχμὴν λέγουσιν νῦν ἐν τοῖς ποτέτοις ἅπαντες, ὅτι οἱ Ῥωμαῖοι δηνάριον ὀνομάζουσιν. I suppose, that he means the silver drachme; for so all the later Physicians are wont to call it, neither will the nature of the thing suffer us to understand any other. And it is manifest that in such things as we all now name the drachme,$

the

Galenus l. 8.
de compos. me-
dicam.

de medicam. 2
de medicam.

the Romanes name the Denarius.

The *denarius* also, as we proved before out of *Philo*, *Iosephus*, *Saint Hierome*, and *Hesychius*, may be inferred by the Hebrew, or Samaritane shekel: the shekel, by the joint testimony of all of them, being equall in valuation to the Attick *stater argenteus*, or *tetradrachme*, and the Attick *tetradrachme*, as we have shewed, to 4 *denarii Consulares*: if therefore an Hebrew, or Samaritane shekel in silver, fair, and not impaired, were found, we might by this as well discover the *denarius*, as by the *tetradrachme*, or the *aureus*. And here I must confesse I have not seen so many perfect, and entire, with the Samaritane characters, vvhich certainly are the best, and truest, (For those with the later characters, invented, as some suppose, by *Esdra*s, are most of them counterfeit) as to give my self satisfaction. For though I have perused that of *Arias Montanus*, now in the University of Oxford, which he describes in his tract *de Siclo*, and from whence he deduces the proportion of the Hebrew shekel, yet to speak the truth, there is no trust to be given to it: Not but that the coin is very ancient, and the inscription upon it in Samaritane characters well made; but the sides of it have been so filed away, that it hath very much lost of the true weight. For I finde it to be scarce the weight of twenty pence of our English Standard. Whereas *Montanus*, if he made his observation exactly, equals it to almost four Spanish rials, or to four Romane *Inlios*: both which exceed two of our English shillings. So that till such time as I may procure one of

of the East, (whither I have often sent) some perfect shekels, I must be content to take up the relations of others. And here I shall begin with *Moses Nehemani Gerundensis* a Jew, a learned expositor of the Pentateuch, who as *Arias Montanus* tels us, flourished in Catalonia above 400 years since. His words, as *Montanus* hath delivered them in his tract *de Siclo*, are these. & *In comment. Exod. 39. multis verbis differens significabat se non facile ad Salomonis Iarrhai, qui ante illum in Galliâ scripserat, sententiam de siclo accedere; cum Salomon affirmasset, Siclum esse dimidiam argenti unciam. Postea jam absoluto in omnem Legem Commentariorum opere, idem Moses Gerundensis capite ad eam rem propriè addito, sicli æstimationem à Salomone illo indicatam, re ipsâ doctus, ingenuè, & aperte, ut viros doctos, & veri inveniendi, atque docendi cupidos decet, comprobavit. Narrat autem se eo anno, quo illa scriberet, in Palestinam ex Hispaniâ sacrorû locorum visendi causâ navi delatum Acconam, quam nunc Iachan vocant, devenisse; ibidémque sibi ab incolis ostensum fuisse nummum argenteum antiquissimum, expressis tamen signis & literis conspicuum; in cujus altero latere forma esset vasculi illius, quod mannâ plenum in sacra arca ad seculorum monumentum, Dei jussu, & Mosis procuratore fuerat repositum: & in altero ramus ille admirabilis, quem in fasciculum virgularum plurimarum Aaronis nomine illatum (cum illius sacerdotali dignitati ab æmulis quibusdam obrectaretur) postera die populus omnis florentem, amygdalâque explicantem vidit; inscriptiones etiam fuisse in eodem nummo Samaritanis characteribus*

& *Arias Montanus de siclo. in libro qui inscribitur Thubal Kain, sive de mensuris.*

bus, quæ olim communes totius Israelis literæ fuerant, ante discessionem decem tribuum à duabus, lingua planè Hebraica, quarum exemplum ex alterâ parte erat SEKEL ISRAEL, quod Latine sonat Siclus Israelis: ex alterâ verò IERVSALEM KEDESSAH, hoc est Ierusalem sancta: qui nummus antiquitatem cum primis magnam probabat, utpote cusus nomine Israelis, eo tempore quo omnes XII. tribus communi concordia Israelis nomen obtinebant; quòque Hierosolyma ipsis omnibus regia urbs, sanctaque erat; eademque communis omnibus & religionis, & publicæ rei, & moneta, atque literarum ratio, quæ postea discessione factâ, alia atque alia utrique parti fuit. Namque Iudei, ut omnes ferè scriptores asserunt, necum Schismaticis Israelitis ullo Sacrorum usu communicarent, eam Literarum formam, quæ nunc etiam in usu est, hoc est quadratam, mutatis valde alterius prioris figuris, adinvenère. Affirmat præterea idem Gerundensis, nummum illum, qui Siclus inscribebatur, sibi in staterâ pensum dimidia argenti uncie pondus reddidisse, ostensam quoque alteram monetam dimidiato pondere minorem, iisdem omnino vasis & rami figuris, quæ tamen non SEKEL, sed HHASZI SEKEL, hoc est dimidius Siclus diceretur: probari itaque sibi vel maximè Salomonis Iarxhai, de sicli pondere, & valore, sententiam. Thus far Gerundensis: who if he had expressed with what half ounce he compared his shekel, or if Montanus had done it for him, they had given the judicious Reader better satisfaction. But this I suppose, by a probable conjecture, may be supplied, in saying that he living in Catalo-

^b *Eadem omnino sunt uncia, quibus olim Romani, Hispanique utuntur. &c.*

Villalp. de appar. Urb. ac Templi par. 2. l. 3. c. 20.

ⁱ *Ciaconius de ponderibus pag. 45.*

^k *Villalpand. de app. Urbis ac Templi par. 2. l. 2. disp. 1. c. 28.*

* We may also insert the observation of Anton. August. dialo- go 2. Ne ho uno [sic] che è d' argento, & è di peso di quattro dramme conforme à quello che dice San Girolamo sopra Ezechiel- le: where by four drams he means half the Roman ounce.

nia weighed it with the Catalonian, or Spanish half ounce; which ^b *Villalpandus*, and ⁱ *Ciaconius*, both of them Spaniards, make equall to the half ounce now used at Rome, that is, to two shillings three pence farthing, q. of our mony. This conjecture of mine will exceeding well confirm those many observations of *Villalpandus*, a man in this kinde very curious; which he made of severall ancient shekels in silver, who thus writes. ^k *Igitur ante aliquot annos appendimus Siculum unum apud F. Vrsinum, & postmodum eos omnes, quos precedenti capite percensuimus, atque comperimus singulos argenti siclos ex aequo semuncia Romanae antiquae respondere; ita ut ne minimum quidem hordei aut frumenti granulum, huic, vel illi lanci addi potuerit, quin in eam examen propenderet. Nec mirum cuiquam videri debet, antiquissimos nummos suo pristino ponderi nunc respondere, neque ullam argenti partem vetustate consumptam tot saeculis fuisse. Nam singulari Dei beneficio nobis contigit, tot integros appendere potuisse siclos. Id quod nummi ipsi integri vetustatem maxime prae se ferentes, literae expressae, extantesque, argenti color, atque alia id genus multa, facile probant.* With these observations of *Villalpandus* I finde the weight of a very fair Samaritane shekel of the truly noble, and learned *M. Selden* to agree: to whom I stand obliged for this favour, as he doth for the coin to the honourable Antiquary *Sir Robert Cotton*. To these testimonies, though (it may be) sufficient of themselves, I shall add * one more, for farther illustration of the weight of the Hebrew, or Samaritane shekel, and that is

is of an ancient, and fair one, in silver, amongst his Majesties coins, perused by the most reverend Primate of Ireland, a man of exquisite learning, and judgement, who hath often assured me that it weighs two shillings five pence of the English standard; which proportion excepting some few grains, in which it doth exceed, does well correspond with those of *Villalpandus*. And this may farther be confirmed out of the Talmud ¹ כל כסף האמורה בתורה כסף צורי ¹ Kiddushb. 11. ושל דברי ה"ם כסף מדינה *Argentum omne* ² *cujus in Lege fit mentio, intelligitur argentum Tyrium* (ponderis & bonitatis ut in urbe Tyri: as ^m *Schlinder* interprets it) *sed Rabbiorum argentum* ^m *Schindlerus* *intelligitur argentum commune provinciale.* in pentaglotto. Taking therefore the silver mony of Judea, as the Talmud doth, to be equall to the Tyrian, and that of Carthage to be equall to that of Tyre: as it is very probable, that the Carthaginians, being a plantation of the Tyrians, might observe their proportions in coins, as vvell as their customes, in religion, we may by these discover the shekel to be much about the same weight that hath been assigned. For ⁿ *Ant. Augustinus*, describing ⁿ *Ant. August.* in his dialogues the weight of two fair Cartha- *diatog. 6.* ginian coins in silver, writes, that they are each of them somewhat more then four drachmes, that is, as he elsewhere explains himself, a litle more then half the Romane ounce. If therefore we shall adhere to the observation of *Gerunden-sis*, made four hundred years since, or to these later of *Villalpandus*, and others; or to this conjecture of mine, the Hebrew shekel, and half the present  Romane ounce, are either both
the

the same, or else very neer in proportion.

And this may easily be granted ; but if it be, how vwill 4 *denarii Consulares*, 4 Attick drachmes, and the Hebrew shekel, be reciprocally equall one to another, as they should be by those severall testimonies before alleaged ? Whereas by many hundred *denarii Consulares*, tried by an exact balance, I finde the best of these to contain *LXII.* grains English, and the Attick drachme *LXVII.* And the fourth part of the shekel to be but *LIV.* grains $\frac{3}{4}$, if we admit of *Gerundensis*, and *Villalpandus*' observations. Which notwithstanding according to *Philo*, *Iosephus*, Saint *Hierome*, *Epiphanius*, and *Hesychius*, should be equall to the Attick drachme, and the Attick drachme by the testimonies of the ancients should be likewise equall to the *denarius*. For the solution of this objection I answer. First, that the *denarius*, and Attick drachme, being distinct coins of different States, and not much unequall in the true vweight, it is no wonder, especially in *Italy*, and in the *Romane* dominions, that they should passe one for another : no more then that the *Spanish* rials in our Sea Towns in *England*, should passe for testars, or the quarters of the dolar be exchanged for our shillings : whereas the riall in the intrinsecall valuation is better then our testar by four grains, and somewhat more, and the quarter of the dolar is better then our shilling by more then 8 grains, or a penny ; but because they want the valuation, character, and impression of our Princes, vvhich I call the *extrinseck of coins*, therefore doth the *Spanish* mony fall from

from its true value with us, and so would ours doe in *Spain*. By the same analogy must vve conceive the *Attick drachmes*, though in the intrinsic they were somewhat better worth then the *denarius*, yet for want of the extrinsec, to have lost in *Italy*; and thereby to have become equall in valuation to the *denarius*. *Vol. Metianus de assis distributione.* And this seems to be implied by *Volusius Metianus. Victoriatus enim nunc tantundem valet, quantum quinarus olim. At peregrinus nummus loco mercis, ut nunc tetradrachmum, & drachma, habebatur.* These words of Metianus I finde in a *MS.* of *Temporarius* thus corrected: *Victoriatus enim nunc tantundem valet, quantum quinarus Olim ut peregrinus nummus loco mercis, ut nunc tetradrachmū, & drachma habebatur.* Whether it be by conjecture, or that he found it in some ancient *MS.* I know not, but the emendation I cannot but approve.

Pendens drachmam putate ejusdem ponderis esse cum denario, Onuphrius verò inter utrumque statuit rationem sesquiterciam, Agricola sesquiseptimam, ut Panvinio tres denarii quatuor drachmas, Agricola verò septem denarii octo drachmas efficiant. Capel. de pond. & nummis l. i. LXXXIV. denarii, quæ est Libra Romana, sunt æquales XCVI. drachmis, quæ est libra Italica, & medica. Scal. de re nummariâ.

because

because in ordinary commerce, and in vulgar estimation they passed one for another, in the Romane state; or else if any were so curious, to observe their difference, as surely the *κολλυβισται* were, yet by reason of their neernesse, and to avoid fractions, and having no other names of coins that were precisely equall, whereby to render them, therefore all Greek, and Latine Authours, mutually used one for the other. And secondly, because some Writers, as *Dioscorides* and *Cleopatra* affirm, that the Romane ounce contained eight drachmes, therefore modern Authors infer, that the *denarius* being equall to the drachme, and eight drachmes being in the Romane ounce (as so many were in the Attick) that therefore there are eight *denarii* in the Romane, and consequently that the Romane, and Attick ounces are equall. Whereas *Celsus*, *Scribonius Largus*, and *Pliny*, as we shewed before, expressly write, that the Romane ounce contained in their time, which was after *Dioscorides*, seven *denarii*. And being naturall Romanes, and purposely mentioning the proportion of the *denarius* to the ounce, thereby the better to regulate their *doses* in physick, it is not probable, but they must better have known it then the Grecians. Besides, vvho with any certainty can collect out of these imperfect fragments of *Dioscorides*, and *Cleopatra* (for these tracts of theirs *de ponderibus* are no better) whither at the first they wrote in that manner, as they are now printed? Or if they did, why might not they indeavour to introduce into the Romane ounce, in imitation of the Attick,

tick, that manner of division, which is now generally received in our times, of making the ounce, of vvhhat kinde soever it be, to contain eight drachmes. And surely this of eight being *a compound number*, as Arithmeticians use to speak, was much fitter then seven, used by the Romanes, which being *a prime number*, is therefore incapable of any other division. And then for to conclude, that because the Attick ounce had eight drachmes, and the Romane as many, that therefore their ounces are equall: is all one as to conclude, that the Paris, and English ounces are equall, because the French as well as we (and so doe all Physicians of all Countries that I know) divide their ounce by eight drachmes. And thus, I suppose, I have sufficiently answered the first part of the objection, concerning the *Denarius*, and the Attick drachme: that if we respect the vulgar and popular estimation, in which sense classicall Authours understood them (For they could not wel otherwise render them, then as they were currant) so were they equall; but if we respect the intrinsecall valuation, which depends upon the weight, especially when coins are of a like finenesse, so were they unequall: the Attick drachme being of our mony eight pence farthing *q*, and the *denarius Consularis* seven pence half penny farthing: allowing for the standard

* VIII. English grains to the silver penny.

* These proportions, with those before, & those which follow, are taken from the English standard at five shillings the ounce (as it was formerly coined) to avoid fractions: that is, eight grains to the silver penny: whereas in these times it is five shillings.

two pence. Not that the ounce is increased, for this is alwaies constant and fixt, but that for reasons of State, our silver coins are diminished, and consequently contain fewer grains. And this diminution must necessarily be, as often as other Nations, with whom we have commerce, rebate in the proportions of their coins; or else we must be content to be losers.

Neither do I know any authority, that either exprefly, or by a true, & logical confequence, can be produced out of Claffical Authors to infringe this affertion of mine, unleffe it be one in *Fannius*, which being a fragment is the leffe to be valued: and another in *Livy*, who thus writes, *Lib. 34.* in his description of the triumph of *Quinctius*. *Signati argenti octoginta quatuor millia fuere Atticorum, tetradrachmum vocant; trium ferè denariorum in fingulis argenti eft pondus.* Which words of his occafioned *P Georgius Agricola*, not knowing how to answer them, to bring in a diftinction of three forts of *denarii*: the *Gravis*, weighing an Attick drachme, and an half, the *Mediocris*, one & a feventh part, the *Levis*, moft cõmonly one; without any cleer proof, or evidence in any ancient Author, and directly contrary to all ancient coins of the Atticks, and Romanes, which I have feen: of which errour he would not have been guilty (For there is no man that hath writ either *de ponderibus*, & *menfuris*, or *de re metallicâ*, more folidly, and judiciously then he) if he had been fo happy as to have perufed many intire Grecian *aurei*, & *tetradrachmes*, or elfe to have examined a greater, and more felect quantity of Romane coins. To fatisfie my felf concerning that place of *Livy*, I had rëcourfe to our *MSS.* here (and I could wifh I had done the like in *Italy*) and thefe I finde to agree with the printed copies; though the coins, which are much ancienter then any *MSS.* constantly difagree. Wherefore if it be not a miftake in *Livy* himfelf, which I am not apt to beleevè in fo grave an Authour, I would correct

*P G Agricole
refponfio ad Al-
ciatum de pond.
& menfuris.
Argentei Ro-
manorum de-
narii triplices
funt: graves,
qui pendunt
drachmam At-
ticam cum di-
midia: medio-
cres, qui drach-
mam & fepti-
mam ejus par-
tem: leves, qui
plerumque
drachmam.*

correct the copies by the coins, and instead of *III. ferè denariorum*, make it thus, *IV. ferè denariorum*. Where the figure *V*, being resolved into two lines, and left a little open at the bottom, might easily be taken by the scribe for the figure *II*. And this I doe certainly * beleieve is the true ground of that errour, wherewith so many of late have been perplext, However it were, it is as ancient as *Priscian*, or *Pseudo-Priscian* (as *Capellus* styles him) who, in his tract *de ponderibus*, reads those words of *Livy* in the same manner, *trium ferè denariorum*.

As for the *denarius aureus*, a name I think not known to the Ancients, which *Salmasius* and others collect out of *Livy*, *de fœdere Ætolico*. *Pro argento si aurum dare mallerent, dare convenit, dum pro argenteis decem aureus unus valeret*. I see no solid foundation for that opinion; all that can be collected thence is, that the gold then was in decuplâ ratione to the silver, which I have proved before. And whereas *Plautus* hath his *denaria Philippea*.

Nummi octingenti aurei in marsupio infuerunt,

Præterea centum denaria Philippea.

this is a metaphorical, or comical expression of him, and no certain sort of coin: which he pleasantly calls *denarii*, because half the *χρυσοὶ* *φιδίππειοι* were equall in weight to the *drachma*, and so also was the *Romane denarius* supposed to be,

Nor are we to take the *κλῶσος*, which is thrice mentioned by Saint *Matthew*, and once by Saint *Mark*, for the *denarius*, as some have done: no, nor for any other sort of coin. For it is pre-

* If this answer be not satisfactory, we may say, as some have done, that *Livy*, *Fannius*, and the Scholiast of *Nicander*, speak of the *denarii* of the former Consuls immediately succeeding *Q. Fabius*, For there being but six of those in the ounce, (as they suppose) the *denarius* will be greater then the *drachma*, as it will be lesse when seven were coined, under the later Consuls, which is our assertion. *¶ Livius l 38.*
¶ Plautus in Rudente.

cisely the Latine word *census*, that is, ὁ φόρος, *tributū*, and so is it rendred by Saint *Luke*, Εξέσι Καίσει φόρον δέναι, ἡΰ; vvhhere Saint *Matthew*, and Saint *Mark* have it. Εξέσι δέναι κλῶσον Καίσει, ἡΰ; Though *Hesychius*, and *Moscopolus*, both upon an errour, interpret it a sort of coin. *Hesychius*, Κένσος ἑίδε νομίσματος ὅπικεράλαιον, or νομίσματος ὀπικεραλαίς, as M. *Casaubone* corrects it: and *Moscopolus*, Κλῶπος νόμισμα δρεχμῆς ἰσοῦσάπον, *the census is a coin equall in weight to the drachme*, that is, in the notion of the Greeks equall to the *denarius*. The errour of these two Greek Grammarians, is a misunderstanding the propriety of the Latine word *census*: and that occasioned them to take κλῶπος, and νόμισμα τῷ κλῶσι, for the same. But the Evangelist *Matthew* puts a manifest difference between κλῶπος *tributum*, and νόμισμα, the mony that was paid for tribute. Επιδείξατέ μοι τὸ νόμισμα τῷ κλῶσι, writes Saint *Matthew*, *shew me the mony of the tribute*: or as our new Translation renders it, *Shew me the tribute mony*. And the three Evangelists, *Matthew*, *Mark*, and *Luke*, immediately after expressly tearm this mony the δινάειον. Οἱ ὃ προσένεγκαν αὐτῷ δινάειον, *And they brought unto him a penny*. Which being a Roman coin, and currant amongst the Jews, being then in subjection to the Romanes, it is more then probable that they paid their tribute to *Cesar*, in the same species of mony that was used by *Cesar*: and not with any new, or peculiar sort of coin, according to *Baronius* (which M. *Casaubone* hath justly confuted) but with the ordinary currant mony of *Rome*, and that was the *denarius*.

Of the Denarius:

Our next solution should be of the *shekel*, how it could be equall to the *tetradrachme*, and consequently to 4 *denarii*, when by the constant weight of the best Hebrew, or Samaritane shekels, extant, wee finde them to bee much lesse. And here I am a little unsatisfied, how to reconcile the coins to *Philo*, *Iosephus*, *Epi-phanius*, Saint *Hierome*, and *Hesychius*: or else, if we admit of the coins (as I know no just exceptions against them) how to excuse these Authours of too supine negligence in comparing them, if so be they ever vvere so curious as to collate them vvith the Attick *tetradrachmes*. For if vve shall say that the silver *stater*, or Attick *tetradrachme*, vvas a forain coin, in respect of the Rep. of the Jews, and therefore that in *Judaea* it might somewhat fall from its true valuation, vve shall say no more then what reason, and experience confirm. But then that the *tetradrachme* should sink so low, as to loose four pence half penny, if vve take the reverend *Primates*' observation before mentioned, or vvhich is more six pence *q.* if vve follow that of *Gerundenis*, and *Vikalpandus*, or those of mine, upon two shillings nine pence half penny, for so much vvas the *tetradrachme* of our mony, it may seem too great a diminution: especially the Attick mony being as pure, and fine, as that of the shekel: and therefore no Goldsmith amongst the Jews, but vvould have given a greater rate onely to melt it, and turn it into bullion. Yet on the other side, vvhen I consider the practise of the mony-changers amongst the Jews at this day, vvhich it may be

* At my being in *Ægypt* thirty five *madines* passed for a dollar: *Sands* in his travails writes forty.

vvas as bad in *Philos*, & *Iosephus* time, & might occasion our Saviour not long before to vvhipe them out of the Temple, which they by their extortions had made a den of theeves, who now make it a trade at *Alexandria*, and elsewhere, in changing Spanish dollars into * *madines* (or the small silver mony currant in *Ægypt*) to gain one or two *madines* upon every dollar, notwithstanding the Spanish mony is as frequent, and as vvell known in *Turky*, as their own. I can the better imagine they might make the same advantage, or a litle more, upon the Attick tetradrachmes: vvhich it may be also vvere not permitted, being contrary to their law, to passe so generally vvith them, as the Spanish mony now doth (by reason of the image of *Pallas*, and the *noctua* instamped:) or if they vvere permitted, yet they might not be so common, and so vvell known: and therefore upon strangers in *Iudea*, in giving them currant mony, for that vvch vvas forain, they vvould gain so much the more. So that *Philo*, and *Iosephus*, vvhen they equall the shekel to the tetradrachme, may have taken it upon the relation, and practise of these mony-changers, and not upon any experiment of their owne. The same answer may serve for *Epiphanius*, Saint *Hierome*, and *Hesychius*: though it may be these borrowed their descriptions from *Philo*, or *Iosephus*, vvho long preceded them: and being Jews, and living in the time vvhen the State of the Iews vvas in being, vvhereas these did not, their authority is the more to be credited. And thus have vve finished our inquiry of the

denarius

denarius Consularis, by comparing it vwith the Attick drachmes, and the Hebrew shekels.

The last, and best vway to discover the true vweight of it, is by the *Congius Romanus*, whereof by a speciall providence, as ^a *Petus*, and *Villalpandus*, have vwell observed, the originall standard of *Vespasian* is still extant in *Rome*. This, as the superscription upon it *X P* demonstrates, contains the vweight of ten *Romane pounds*, and is equall (by the joint confession of all Authors treating this argument) to six *sextarii*. Again, the *sextarius*, as ^{*} *Galen* vvrites, ἔχει μίαν λίτραν καὶ ἡμίσειαν καὶ ἕκτον, ὥς εἶναι τὰς πέντε ὀνύας καὶ. contains one pound and an half, and a sixth part, so that it hath in all twenty ounces. Or as ^b *Oribasius*, Physician to *Iulian* the Apostate, informs us, is equall to the *Romane pound*, and eight ounces. ^b *Oribasius* l. 2. ad *Eustathium* filium.

Ἰταλικὸν κεράμιον ἔχει ἑξήκοντα μῆ. ἑξήκοντα λίτραν μίαν, καὶ ὀνύαν ἡ. The *Italian Amphora* contains forty eight *sextarii*, and the *sextarius* one pound and eight ounces. The capacity therefore of this *Congius* being filled up vwith sixe *sextarii*, of some certain sort of liquors (For it is *liquorum mensura*) vvill give us ten *Romane pounds*, and consequently their ounces, and *denarii*. The onely difficulty is; with what sort of liquor we must measure it: for all liquors are not of the same gravity. And this is well cleered by ^c *Rhemnius Fannius*, and others.

Illud praterea tecum cohibere memento,

Finitum pondus varios servare liquores.

Nam Libra, ut memorant, bessē sextarius addet,

Sen puros pendas latices, sen dona Lyai.

^a *Petus* l. 3. de antiq. liquid. arid. que mens. *Villalp.* de ap. par. *Vrbis ac Templi* par. 2. l. 3. c. 25.

^{*} *Galen* l. 1. de compos. medicam.

^b *Oribasius* l. 2. ad *Eustathium* filium.

^c *Rhemn.* *Fann.* carmina de pond. & mens.

The *sextarius*, saith *Fannius*, contains one pound and eight ounces, whither vve weigh cleer water, or vvine : where by wine, according to ^d *Agricola*, is to be understood, *vinum fulvū*, such as the Greeks call *κίρρον*; rather I imagine that wine, which *Galen* calls *λακόν*, *κὺδολιγόροον*. The *sextarius* then being one pound eight ounces of cleer water, or pure wine, and sixe *sextarii* being in the *Congius*, it is most evident that the *Congius* contains ten pounds of vvater, or of wine. This also appears by a *Plebiscitum* of the two *Silii*, *Publius*, and *Marius*, which is to be seen in the best copies of ^c *Sextus Pompeius*.

^a *Agricola* l 3.
de ponder. rer. n.

^e *Sextus Pomp.*
de verb. signif.

^f *Fragmenta*
Dioscoridis.

* The propor-

tion that rain
water hath to
fountain water,
is as 10 : 0000

to 1007522, &

the proportion

that it hath to

water distilled,

is as 1000000

to 997065, as it

hath been ob-

served by *Snel-*

lius in *Eratosth.*

Bat l 2 c. 5.

Est in equali

mole ratio aquæ

pluviæ ad di-

stillatam, quæ

admodum

1000000 ad

997065. plu-

viæ autem ad

putealem ut

1000.00 ad

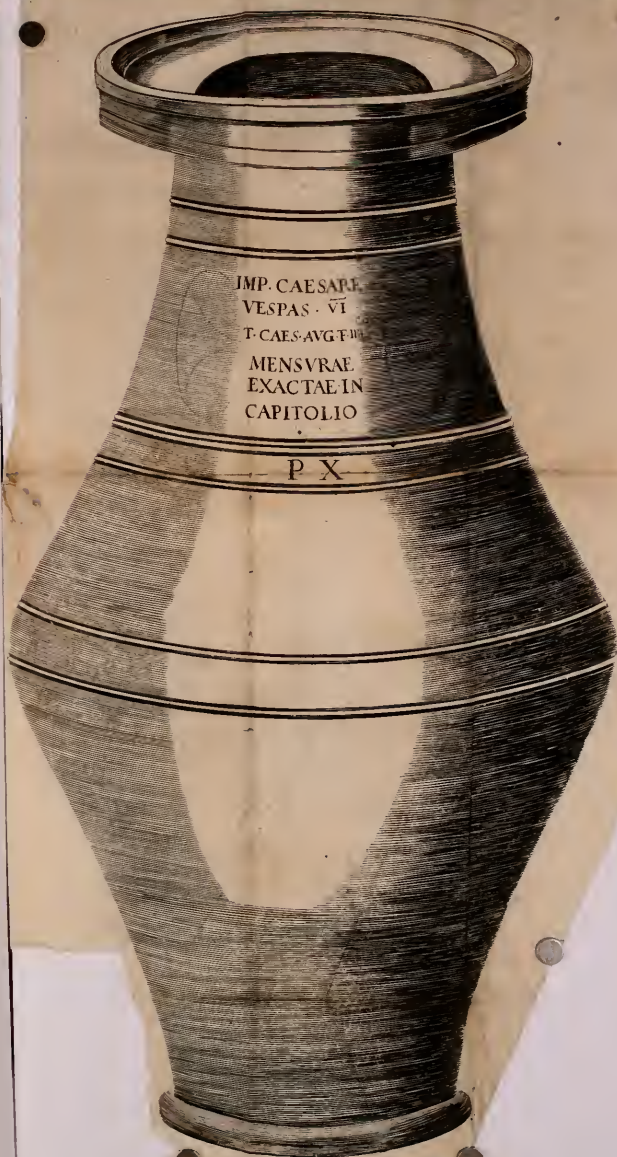
1007522.

VII. QUADRANTAL. VINI. OCTOGINTA. PONDO. SIET
CONGIUS. VINI. DECEM. IS. SIET
SEX. SEXTARII. CONGIUS. SIET. VINI
DVO. DE. QVINGVAGINTA. SEXTARII. QUADRANTAL. SIET. VINI
SEXTARIUS. ÆQVVS. ÆQVO. CVM. LIBRARIO. SIET

The same is confirmed by ^f *Dioscorides*: who, for farther certainty, mentions with what sort of vvater vve should measure it : and that is with rain * water, which he makes to be the most infallible of all. ὁ χοῦς τέτρεται τὸ κόρριον ἔχει λι. ι. τὸ ἡμικόρριον ἔχει λι. ε. ὁ ξέστης ἔχει λίτραν μίαν ἥν, &c. ὁ αὐτὸς ὁ σαθμός ἐστὶ καὶ ὕδατος καὶ ὄξους. φασι δὲ τὸ ὁμβρίον ὕδατος πληρωθῆναι ἀλευδέσαστον εἶναι τὸ σαθμόν, ἀγινεῖ δὲ ὀλκός τε καὶ κῆρ. The Chus, (that is, the *Congius*) contains ten pounds, the *semicongius* five, the *sextarius* one pound, and eight ounces, &c. The weight of water, and of Vinegar is the same. They say that if it be filled up with rain water, the weight will be most certain.

The

* This authority of *Dioscorides*, with that other citation following out of an *Anonymus Greek Author*, strongly proves my assertion, that the *drachma Attica* was more ponderous, then the *denarius Consularis*. For there being eighty four of proved, and ten *IOCCCXL. denarii* the testimonies to the *Congius*, before *IOCCXX.* ore of necessity each particular *Congius* contain, yet that differences shew in the cannot any way fewer then the thing intended both *Cleopatra*, *ariis* (being the my drachmes of committed in the *Θμω δὲ ἔσσι* but in weight an *Ἐχμ δὲ ὀξέσσι* hundred and twenty *dis*.



* *The Congius Weighs seven hundred and twenty drachmes.* An *Anonymus Greek Author*, falsely reputed to be *Galen* in the edition at *Venice*, confirms the same, ϵ Παρὰ τῇ τοῖς Ἰταλοῖς ἐνρί-
 πει τὸ χῆς μέτρω μὲν ἔχων ξ'ς, κοτύλας ιβ'. σαθμὸν
 τῷ ὁδοῦτος ὁμῆρις, ὅπερ ὅτιν ἀφ' ὧς δέκατον, δεξαχμίας
 ἄκ. Amongst the Romanes is found the Congius, con-
 taining in measure six sextarii (that is) XII Cotyla:
 but in weight, of rain water, which is most infalli-
 ble, 1500 drachmes. And whereas *Dioscorides*
 elsewhere writes. Τὸ κόβριον ἔχει λίτρας θ'. τὸ ἡμι-
 κόβριον λ'. δ' S. ὁ ξέσνης ἔχει λ'. δ' S. The Congius hath
 nine pounds, the semicongius four and an half, the
 sextarius one and an half; there is no repugnan-
 cy

these denarii in the Roman pound, as we have elsewhere proved, and ten
 Roman pounds in the Congius, it is most evident there are 15000 dena-
 rii in the whole Congius. Again, 1500 drachmes, by the testimonies
 of *Dioscorides*, and this *Anonymus* writer, being equall to the Congius,
 and the Congius being equall to 15000 denarii, therefore 1500
 drachmes are equall to 15000 denarii, and therefore of necessity
 every particular drachme of these, must be greater then each particular
 denarius. And though, according to my assertion, the Congius contain-
 eth some few drachmes more then are by them assigned; yet that diffe-
 rence, seeing it might many waies happen, as I afterwards shew in the
 like experiments of *Villalpandus*, and *Gassendus*, it cannot any way
 overthrow my conclusion. For the drachmes are still fewer then the
 denarii *Consulares*, and therefore greater: which was the thing intended
 to be proved. And this may farther be confirmed, in that both *Cleopatra*,
 and this *Anonymus Author*, make also the ξέσνης, or sextarius (being the
 sixth part of the Congius) to containe an hundred twenty drachmes of
 fountain water. Whereby it appears there is no error committed in the
 former numbers. ὁ ξέσνης μέτρω μὲν ἔχει κοτύλας β' σαθμὸν δὲ ς' ρκ'.
 The sextarius, saith *Cleopatra*, contains in measure two cotyls, but in weight an
 hundred and twenty drachmes. And the *Anonymus* writer, ἔχει δὲ ὁ ξέσνης
 σαθμὸν δεξαχμίας. The sextarius contains in weight an hundred and twenty
 drachmes. ϵ *Anonymus Græc.* ϵ *Fragmenta Dioscoridis.*

cy between this, and his former assertion. For here he speaks of the *Congius* filled with oil, and before of the same *Congius* filled with water, or wine: and that this should be but nine pounds, whereas the former is ten, is no more repugnant to reason, then it is to nature; that oil should be lighter then water, or wine: which

^a *Ghetaldus in Archim: promot.*

^b *Ghetaldus*, in his *Archimedes promotus*, hath demonstrated the most accurately of any man, to be in the proportion that 1 is to $1\frac{1}{15}$ in respect of water, and as 1 is to $1\frac{1}{3}$ in respect of wine: which is almost the same with *Diascorides*. The not observing this difference of weight, arising from the different gravity of severall liquors, in vessels of one and the same capacity, is that which hath occasioned much uncertainty, and confusion, in modern writers. And therefore we shall for farther perspicuity insert that distinction, which is often inculcated by ^c *Galen*, that the Romanes used two sorts of ounces, and pounds: and those were either *σαμναῖ*, or *μετρικαῖ*, *ponderall*, or *mensurall*: the one had respect solely to the gravity, the other to the *moles*, and gravity conjointly: the former were alwaies certain and fixt, consisting of solid matter: the later were *Vasa* (frequently *ἐν κέcyτοι*) being receptacles, and measures of liquid substances: and therefore the *libra*, and *uncia mensurales*, in these vvere greater or lesse, according as the liquor to be measured vvas heavier, or lighter. Whence ^k *Galen* blames Physicians for not expressing this difference.

^a *Li. 6. de comp. pos. medicam: sec: genera.*

² Διδ. χρᾶσθαι ἐχρήν ὁπμελέσεον ἐν ταῖς φαρμακίησι βίβλοις τὸς ἰατροὺς ὁποίας τινὰς κελύουσι βάλλε-

ὅτι τὰς ἑξήκας ἢ τὰς λίγας τῶν ὑγρῶν φαρμάκων,
 ποτερον τὰς μετρίους, ἢ τὰς σαθμύχους. And he gives
 the reason of it. ¹ Αἱ γὰρ τὸ σαθμύχαι τὸ βδέεος κρι- ¹ Lib. 1. de com-
 νῆσι τῶν σωμάτων, αἱ δὲ μετρίαι τὸ ὄγκον. For the ponde-
 posit. medicam-
 r all examine the weight of bodies, but the mensural ² secundum gene-
 ra.
 the moles. But to return to the Congius, and by it ^m Perinde verò
 to our discovery of the denarius. The water then ^{ut vinum hoc}
 must be naturall, either of some fountain, or of ^{factitium omni}
 rain. For if it be artificiall, such as are made by ^{nativo est levi}
 distillations, whither by a strong reverberation, ^{us, sic aqua fer}
 or by a gentle, in an alembick, these having some- ^{omnes, quæ igr}
 what of the property of fire vwill be lighter then ^{nis calore rebus}
 the naturall, as ^m Agricola, and others observe. ^{quibuscunque}
 I shall produce two observations of the Congius ^{excoctis destil-}
 vvith fountain vvater, made by two very emi- ^{larint, quas}
 nent, and able men, Villalpandus, and Gassendus, ^{ob id distillatas}
 the one at Rome, with the Romane weights, from ^{appellant, cate-}
 the * originall Congius it self, the other at Aix, ^{ris aquis levio-}
 with the Paris weights, from a model, or copy ^{res sunt. Agri-}
 of that at Rome, procured by Peireskius. And ^{cola l. 3. de}
 here to compare the denarius Consularis vvith ^{pondere rerum.}
 their observations, it is necessary to have ex- ^{* This Congius}
 actly both the Romane, and Paris weights, The ^{I had weighed,}
 former, with as much accuratenesse, as, it was ^{if I could have}
 a work. The want of which occasioned Villalpandus to suspect the observa-
 tion of Patus: though Patus writes thus of himself. Plenum, cum iustissimâ
 trutinâ, quâ hodie Romæ utimur cum appendissem [congiū], inveni aquam,
 quâ eum compleveram libras nostri temporis novem, uncias sex semis efficere,
 quibus uncias quinque, drachmas quatuor, scripulum unum, & grana XIV.
 (quæ amplius sunt in his nostris, quam in antiquis libris computando eum
 congiū libras decem) & ultra scripulum unum, & grana XIV. (de quibus
 nullam rationem habendam esse iudicavi) ex antiquis libris prædictis pendere
 inveni. But Villalpandus trying it long after Patus, with more care, and
 with a balance made of purpose, found it to be exactly ten such pounds, as
 are now used in Rome. All that I could doe was to fill the capacity of it with
 milium

miliun well cleansed, and to compare it with the English measures taken from the Standards. It contained of our measures for wine three quarts, one pint, and one eighth part of a pint. Of our corn, or dry measures, three quarts and about one sixth part of a pint. At my being in Italy, there was found amongst the ruines at Rome a *Semicongius* in brasle, of the same figure with this of *Vespasians*, the sides much consumed by rust. This I also measured, and found it to be the half of *Vespasians' Congius*. From this measure of the *Congius* we may rightly apprehend how vast that draught was of *Novellus Torquatus*, who drank three of these *Congii* at once: from whence he was called *Novellus Tricongius*. The story is recited by *Pliny* [l. 14. c. 22.] *Apud nos cognomen etiam Novellus Torquatus Mediolanensis ad Proconsulatum usque è præturâ honoribus gestis, tribus congiis (unde cognomen illi fuit) epotis uno impetu, spectante miraculi gratiâ Tiberio principe in senectâ jam severo, atque etiam aliâs sævo, sed ipsâ juventâ ad merum pronior fuerat.* In the same chapter *Pliny* likewise discourtes thus of *Cicero*, *lonne to that famous Oratour. Tergilla Ciceronem Marci filium binos congios simul haurire solitum ipsi objicit, Marcoque Agrippa à temulento scyphum impactum.*

possible, were taken in Rome. The other vvere sent me by *Monsieur Hardy*, a learned man of honourable quality in Paris, who compared them vwith the Standard. To begin vwith that of *Vitalpandus*, who gives us a large description, with how much caution, and circumspection, and vwith how exquisite a balance he twice made his experiment, whereby he discovered the vweight of it in vvater to be exactly answerable to ten such pounds, as are now used in Rome: Whence he concludes, ^a *Constanter asserimus antiquam Romanorum libram, unciam, ac pondera, tot ætatum successione, ac Romani imperii perturbationibus minime immutata fuisse, sed eadem per manus tradita usque ad nostra tempora perdurasse.* This Romane pound of his reduced to the English Standard for silver, or Troy

^a *Vitalpandus*
l. 2. disp. 2. c. 11.
de apparatu
vrbis ac Tem-
pli.

Troy vveight, vvith vvhich I have faithfully col-
lated it, is 5256 grains English, such as the
Troy pound is 5760: the whole *Congius* there-
fore confisting of ten pounds, will be 52560 Eng-
lish grains. The other obfervation is related
by ° *Gassendus*, in his elegant difcourfe de vitâ ° *Gassendus in*
Peireskii. *Vt paucis ergo res dicatur, cationes vitâ Peireskii.*
adhibuimus eafdem, quas Lucas Patus, & Villal-
pandus, dum vas ipfum, ad summum collum pute-
ali aquâ opplevimus, expendimus, vasis pondus
subduximus. Deprehendimus autem aquam, quæ
Romano pondere effe debuit decem librarum, feu
unciarum centum viginti, effe pondere Parifiensî
(quale nempe Parifiis exploratum, miffumque eft)
librarum feptem, minus uncia quadrante: feu
unciarum centum undecim, & quadrantum uncia
trium. Deinde ex hac proportione collegimus unci-
am Romanam continere grana quingenta, & tri-
ginta ſex, qualium quingenta ſeptuaginta ſex in
Parifiensî continentur: unde & illis in drachmas
collectis, obvenere cuilibet drachmæ grana ſexa-
ginta ſeptem: idque proinde cenſuimus pondus
*denarii Caſarei, quem dictum eſt fuiſſe * drachma-*
lem. Now the Paris ounce ſent to me by Mon-

* The infe-
rence of *Gaf-*
ſendus I eaſily
grant, that the

denarius under ſome of the *Cæſars* was *drachmalis*, that is, the eighth part
of the *Romane* ounce. But neither was it alwaies ſo under the *Cæſars*, nor
if it had been ſo, will it therefore follow that it was *drachmalis*, or the eighth
part in reſpect of the *Attick* ounce. Seeing the *Athenian* ounce was grea-
ter then the *Romane*, as we have before proved; and therefore the *Denari-*
us Conſularis, which was the ſeventh part of the *Romane* ounce, was ſcarce
the eighth part of the *Attick*. Where fore he muſt ſee how he can make it
good, where he brings *Peireskii* in the ſecond book of his life thus diſ-
courſing --- *Denarium, cum tempore Regum pependiſſet trientem uncia, ſub an-*
tiquâ tamen Rep. pependiſſe ſolum ſextantem, ſub recentiore partem ſeptimam,
ſub primis Cæſaribus octavam, ſeu drachmam (Atticæ nempe drachmæ æ-
qualcm.)

ſieur

sieur Hardy, containing four hundred seventy two grains English, and an half, and the *Congius*, according to *Gassendus*, of the *Paris* ounces $111\frac{3}{4}$, the compleat weight of the *Congius* in grains will be $52801\frac{7}{8}$. Which sum exceeds that of *Villalpandus* by $241\frac{7}{8}$, that is, by more then half a *Romane* ounce. This difference (though it is not great) between these two observations of theirs might arise, either from the unequall swelling of the water in the *Congius*: or from the different gravity of fountain water at *Rome*, and at *Aix*: or from some inequality of the model, and Originall: or from some defect in the *jugum*, or beam of the balance, vvhich if it vv ere not made by a very skilfull hand, by the pressure of so great a weight, would suffer some alteration. Which vvay soever it vv as, either by some, or all of these, the difference cannot prejudice my conclusion a compleat grain: vv hich no reasonable man but will allow, either for coining, or for walt. For if I divide 52560 , the number of the grains in the *Congius*, according to *Villalpandus*, by 15444 . the number of the *denarii* in ten pounds, the sum will be $3403\frac{4}{7}$. Or if we shall follow *Gassendus*, though I should rather prefer *Villalpandus*, because he took his immediately from the originall, then vv ill the weight of the *denarius Consularis* be $3403\frac{4}{7}$. The fraction in both without any inconvenience may be omitted. And this proportion of the weight of the *denarius Consularis*, if it were necessary, I could farther prove by some of the *aurei Consulares*, which often were double in weight to the *denarii*, as the

the χρυσὸὶ Ἀστροὶ were double to the ἀρξυαὶ ἀργυροὶ; as also by severall *quinarii* in silver (which are the half of the *denarii*) by a very ancient, and perfect * *semuncia*, by a *quadrans*, and *triens*, all of them in brasse of mine own, and by severall other weights examined abroad. One of the I cannot pretermitt, being neer five Roman pounds, and very remarkable for this inscription. EX. AUCTORITATE. Q. JUNI. RUSTICI. PR. VR but the weight of it is a little defective; part of the *silix* (as many of the ancient Roman weights, that I have seen, were * *ex silice*, which is as hard, or harder than marble) being broken away, else the rest is very intire, and well polished. But I conceive that, by those former waies, I have so irrefragably demonstrated the true ponderousnesse of the *denarius Consularis*, that it would be thought superfluous, or a vain ostentation, to endeavour any farther to prove it. Wherefore in stead of that I shall handle the *denarius Casareus*, which is our second inquiry.

The *denarius Casareus*, was that which was made under the government of the *Cæsars*. And this in stead of the face, and inscription *ROMA*, with the character X or X on the fore part, and the impress of the *biga*, or *quadriga*, on the reverse, (in which kind most of the *denarii Consulares* were stamped) had on the reverse severall impresses, and on the other side the image, or resemblance of the Emperour: which occasioned our Saviour to ask the question, when a *σικλίου*, or Roman penny, was shewed to him: *whose is this image, and superscription?* They say

* Of these Roman *Semuncie*, I have bought, and seen severall in brasse. Besides one, which I owe to my very worthy, and learned friend Dr Ent.

* *Patus l. i. de antiq. Rom. & Græc. interu. mensuris*, makes mention of a *libra Romana* in brasse procured by *Fulvius Ursinus*, of singular rarity: in *cujus supremâ planitie argenteis literis hæc erat nota I, & in circumferentiâ hæc aliæ EX. AVC. D. CAES* but this I had not the happiness to see in Italy.

* Matth. 22, 20. unto

unto him *Cæsars*. This *denarius Cæsareus*, it wee respect some definitive quantity, and weight, was as various, and uncertain, as the *denarius Consularis* of the later Consuls was constant, and fixt: being under the first Emperours, sometimes more, sometimes lesse, as the reasons, and exigencies of the State did require, or the profusenesse, and prodigality of those times. Yet this uncertainty (as far as I have observed) was limited within some certain, and determinate bounds: the *denarius Cæsareus* never exceeding the seventh part of the Romane ounce, and never being lesse then the eighth part, but often in a middle proportion between both, and that with much inequality. And this made ^b *Villalpandus*, after many experiments at Rome, to conclude, that out of the *denarii* nothing concerning the Romane weights could be determined. Though *Portius*, *Agricola*, *Ciaconius*, *Snellius*, and severall others, before, and after him, are of a contrary opinion. And it may be, if *Villalpandus* had distinguished between the difference of times, and in them of the different coins, and considered those of the Consuls, distinctly from those of the *Cæsars*, and those of the former *Cæsars*, from those of the later, he would have reformed his judgment. For it plainly appears, upon examination, that the diminution of their weight was an invention introduced after *Antonius* the Triumvirs' time, whereas before the *denarius* was fixt. *Miscuit*, saith ^c *Pliny*, *denario Triumvir Antonius ferrum*, alii è pondere subtrahunt (his meaning is under the Emperours, to *Vespasians*, or his own time) *cùm sit*

^b *Villalpandus*
de apparatu
Vrbis ac Tem.
pli par. 2. l. 2.
disp. 2. c. 13.

^c *Plin. l. 33. c. 9.*

fit justum octoginta quatuor è libris signari. Where he saies very well in speaking so generally, *alii è pondere subtrahunt*, without precisely limiting the proportion. For this, as we observed, was very various, and undeterminate: so that whereas the just number of the *denarii*, according to the practise of the later Consuls, should bee eighty four in the Romane pound, we finde by the weight of the best of them under the former *Cæsars*, that they coined sometimes eighty sixe, eighty eight, &c. till at last there came to be ninety six *denarii* in the Romane pound, that is, eight in the ounce. And this, by a very necessary consequence, may be inferred out of another place of *Pliny*, if we take for granted, what some learned Moderns confesse, and the gold and silver coins found to this day, of the later Consuls, and first Emperours, strongly prove, that as the Atticks made their χρυσός, or *aureus*, double in weight to the δραχμή ἀργυρία: so did the Romanes make their *aureus* double in weight to the *denarius*. Which proportion they might borrow from the *Athenians*, and other *Grecians*, who, as *Arias Montanus* ima-

gines, first received it from the practise of the *Hebrews*: or rather, as I suppose, from the *Phenicians*, and these from the *Hebrews*. From whencesoever it came, it is not much materiall in our inquiry: that which we may safely conclude from thence is this, that the gold being, in respect of weight, double to the silver, the *aureus Romanus* falling in its weight, the *denarius* likewise of necessity must fall: else could they not have continued in *duplâ ratione*. Now in

^d *Arias Montanus* in Thubal, Cain, five de mensuris.

Plin. l. 3. c. 33.

¶ Villalp. de ap-
par. Urbis ac
Templi. par. 2.
l. 2. disp. 2. c. 12
¶ Snell. in Era-
tosth. Batavo.
l. 1. c. 5.
¶ Ibidem.

what manner the *aureus* was first coined, and how afterwards it lost of its primitive weight, *Pliny* informs us. *Aureus nummus*; post annum *LXII. percussus est, quam argenteus; ita ut scrupulum valeret sestertius vicenis, quod efficit in libras ratione sestertiorum, qui tunc erant, sestertios ICCCC. Post hac placuit XL.M. signari ex auri libris: paulatimque principes imminuere pondus, imminuisse vero ad XLV.M.* For this testimony, and the former, we are to thank *Pliny*, seeing there is neither Greek, nor Latine Author extant, from his time to *Theodosius*, that gives us any certainty, what to conclude concerning the ancient coins. And therefore since this later is of great consequence, but somewhat corrupted, I compared it with the *MSS.* in the *Vatican*, and *Florentine Libraries*, and with a fair one in *Baliol College*, which renders the later part of it thus. *Postea placuit X.XL. signari ex auri libris, paulatimque principes imminuere pondus, imminuisse vero ad XLVIII,* where for *XLVIII.* ¶ *Villalpandus* corrects, or rather corrupts, the text, in writing *XLV.* But *Agricola*, and ¶ *Snellius* read it by conjecture thus. *Post hac placuit XLII. signari ex auri libris, paulatimque principes imminuere pondus, minutissimè vero ad XLVIII.* And ¶ *Snellius* gives a reason of it in his *Eratoſthenes Batavus.* *Nam ita argentei denarii, & aurei nummi eadem manet analogia, pondere subduplo, ut quamdin octoginta quatuor argentei è libra, & è singulis uncis septem cudebantur, tam diu quoque aurei duo & quadraginta libram implerent. Postquam vero argentei nummi pondus imminutum est:*

est: ut sex & nonaginta in libram constituerentur, tum quoque duo de quinquaginta aurei, pondere tanto leviores, in singulis libris cudi coeperunt. Which conjecture seems not altogether improbable, if we respect the later Consuls, and first *Cæsars*, in whose times we finde the *aurei* to have been double to the *denarii Cæsarei*; but surely long before *Iustinian*, the *aurei*, or as they were then also called the *solidi*, lost that proportion to the silver, and kept it onely to the *semisses aurei*, to which they were double, as they were in a treble proportion to the *tremisses*.

Wherefore in stead of these conjectures (which have been the bane of many a good Authour) of *Agricola*, *Villalpandus*, and *Snellius*, I would read the later part of those words of *Pliny*, as the *MSS.* doe, till I can see some concluding reason; or good authority of ancient Authors to the contrary. For I doe not see why the *Romanes* at the first might not coin forty *aurei* out of the *libra*, as well as forty silver *teruncii* out of the *denarius*: which *Varro* assures us: *Varro l. 4. de* they did. And who knows whither at the first *L. Latin.* making of their gold coins, which was sixty two years, according to *Pliny*, after the first coining of silver, they endeavoured to keep them in *duplâ ratione*, in respect of weight: which gracefull manner they might afterwards introduce by commerce with the *Grecians*.

And here, ere I proceed any farther in my inquiry after the *Denarius Cæsareus*, I cannot but complain, either of the negligence of former times, or unhappinesse of ours: in that not

^k Xiphilinus in
Anton. Caracalla.

one Authour extant mentions the true weight of the *denarii*, under the *Cæsars*. ^k Xiphilinus relates in his epitome of Dio, how *Antoninus Caracalla* corrupted, & abased the coins; but makes no mention of the weight. Τῷ ἔν Ἀντωνίνῳ, τάτε ἄλλα καὶ τὸ νόμισμα κίβδηλον ἦν, τόδε ἀργύριον καὶ τὸ χρυσίον, ὃ παρείχεν ἡμῖν, τὸ μὲν ἐκ κολλήβδου καταργυρέμενον, τὸ δὲ καὶ ἐκ χαλκῆ καταχρυσέμενον ἐσκάδαζετο. *To Antoninus*, as other things, so also his money was adulterated: For the silver & gold, which he gave us, the one was prepared of lead silvered over, and the other of

ⁱ Suidas in voce
Μονηταρίων
Μονηταρίων.

brasse guilt. ¹ Suidas also speaking of the *monetarii* writes thus. Μονηταριοὶ οἱ περὶ τὸ νόμισμα τεχνίται, οἱ δὲ Ἀυρηλιανῷ διέφθειραν τὸ νόμισμα, καὶ ἔπειτα ἰδίῳν ἀρχόντων φιλικήσιμον ἀνελόντες ἐμψύλιον ἐγείρουσι πόλεμον, ὃς μόλις Ἀυρηλιανὸς χειρωσάμενος ὑπερβαλλόντων κολάσων ὠμότητι κατεργάσατο. *The Monetarii are Artizans employed in the making of money. These in Aurelians time corrupted the money, and; having slain their Governour Felicissimus, raised a civill warre: whom Aurelianus with much difficulty conquering, put to death with exquisite torments. And many good laws were made, by severall Emperours, against adulterating, and corrupting of coins: and those executed with much severity, even in the time of Christianity. For we finde under the Emperour Constantine, that such as offended in this kinde, were not onely put to death, but to a cruell, and bitter death by fire. L. OMNES SOLIDI. C. THEOD. SI QVIS SOLIDI CIRCULVM EXTERIOREM INCIDERIT, VEL ADULTERATVM IN VENDO SUBSECERIT. Omnes solidi, in quibus*

bus nostri vultus, ac veneratio una est, uno pretio aestimandi sunt, atque vendendi; quanquam diversa formæ mensura sit: quod si quis aliter fecerit, aut capite puniri debet, aut flammis tradi; vel aliâ pœnâ mortiferâ. Quod ille etiam patietur, qui mensuram circuli exterioris adraferit, ut ponderis minuat quantitatem, vel figuratum solidum, adulterâ imitatione, in vendendo subjecerit.

In *Constantinus* time the same punishment was inflicted. *L. PRÆMIO. C. THEOD. DE FALSA MONETA.* Premio accusatoribus proposito, quicunque solidorum adulter potuerit reperiri, vel à quoquam fuerit publicatus, illicdò omni dilatione submotâ flammarum exustionibus mancipetur. And afterwards under *Valentinianus*, *Theodosius*, and *Arcadius*, they were accounted; and suffered as *rei læsæ Majestatis*. *L. FALSÆ MONETÆ. COD. EODEM.* Falsæ moneta rei, quos vulgò paracharactas vocant; Majestatis crimine tenentur obnoxii. But no where is it mentioned concerning the *denarii*; and *quinarii*, which were the silver coins, in common use; how much should be their weight. Wherefore in such a silence of ancient Authors; we have no more solid, and sure foundation of our inquiry: then either by our selves to examine the weight of the fairest coins under the Emperours: or else to relate, what others long before our time have observed; *Antonius Augustinus* in generall informs us; when coins were at their highest perfection; and how they began to decline with the *Romane Empire*: as commonly when money comes to be abused; and that the mint, like the pulse, beats too slowly, and

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it

irregularly, it is an evident symptome of some distempers in the bowels of a State °. * The

* ° Le medaglie di tutti i tempi [sono degne da esser osservate degli Artifici] cominciando de Alessandro magno, nell'età del quale principalmente fiorirono, per fin al tempo dell'Imperador Galliceno, nel quale caddero affatto insieme con l'imperio. Da indi poi in finà Giustiniano si trovano bon medaglie di tutti gli Imperadori: ma con notabil perdita della pulitezza, & perfettione antica. Quel poi che habbiamo duppo Giustiniano, è tanto cattivo che non si può soffrire. Et se ne dà quasi da ognuno la colpa à gli Vm̃i, à i Vandali, à gli Alani, à i Goti, à i Longobardi, & ad altre barbare, & fiera nationi, che signoreggiarono gran parte d'Europa. Ant. August. dialog 1. P. Havendo io tali monete le quali sono del peso di un denario Rom. parèggiate di peso alle medaglie di argento, che hanno scolpite le teste de i Principi Romani, le ho ritrovate differenti non poco del peso, sì che quelle medaglie pesano quasi tutto meno del Denario; & havendo ancora pesate quelle medaglie che hanno scolpita la effigie de i Cesari, le ho sempre ritrovate differenti fra loro nel peso. Erizzo.

having

having also weighed those medailes which have the effigies of the Casars, I have continually found them different amongst themselves in weight. This uncertainty so troubled Villalpandus, after many experiments made at Rome, that he knew not what to determine. And it seems ⁹ Blondus long before conceived it impossible. *Hæc omnia qualia per singulas ætates fuerint, examissimè ostendere, non magis difficile, quàm impossibile fuerit, non solum quia obscuris, & nostræ ætate ignotis verbis sunt à majoribus tradita; sed quia omnis ferè ætas suam habuit cundendi varietatem, & formam.* Wherefore, for farther satisfaction of the Reader, I shall relate some observations of mine own: especially those of the twelve first Casars; which I took, with many others, by an accurate balance, from some choice cabinets in Italy. And first, I shall begin with the gold coins. For seeing the *aurei* under the former Casars' were in *duplâ ratione* to the *denarii*, therefore the weight of those being known, we cannot be ignorant of the weight of the *denarii Casarei*. Besides, they are not subject to be consumed by time, and rust, but onely *ex intertrimento*, and therefore wee may the safelier give credit to them. And lastly, because the difference, though but of a grain, is of some consideration in gold, the Masters of the Mint use to be the more circumspect about them: whereas in silver coins, since it is hardly worth the pains to stand precisely upon the excess, or defect of every grain, therefore there are few of these so exact, but either exceed, or want, in the very mint, one

or two graines, and sometimes more.

The weight of some aurei under the first twelve Cæsars.

	Eng: grains.
* C. CAES. COS. III-_____	CXXIII $\frac{7}{8}$
* <i>A second, on the reverse, A. HIR- TIVS. PR</i> _____	CXXII $\frac{1}{4}$
* <i>A third</i> _____	CXXIV $\frac{1}{4}$
AVGVSTVS. CAESAR. III. VIR-_____	CXIX $\frac{1}{2}$
<i>A second, on the reverse, OB CI- VES SERVATOS</i> _____	CXIX $\frac{1}{2}$
* <i>A third, on the reverse, DIVOS. AVG. DIVI. F</i> _____	CXIX
TIBERIVS_____	CXVIII $\frac{1}{4}$
* <i>A second</i> { <i>On the forepart</i> TI. CAESAR. DIVI. AVG. F. AVGV- STVS <i>On the reverse, a temple</i>	CXVII $\frac{1}{8}$
CALIGVLA. _____	
CLAVDIVS, <i>on the reverse, S. P. Q. R.</i> OB. CIVES. SERVATOS-_____	CXVII
<i>A second</i> _____	CXVII $\frac{2}{3}$
<i>A third</i> _____	CXVIII $\frac{2}{3}$
* NERO, <i>on the reverse, SALVS</i> -_____	CXVI
* <i>A second, on the reverse, JVPPI- TER. CVSTOS</i> _____	CXIII $\frac{1}{2}$
* <i>A third, on the reverse, CON- CORDIA. AVGVSTA</i> _____	CXIII
GALBA, <i>on the reverse, CONCOR- DIA. PROVINCIARVM</i> -_____	CXV
OTHO_____	

OTHO, <i>on the reverse</i> , SECVRITAS	
S.P.Q.R. — — — — —	CVIII $\frac{1}{4}$
VITELLIVS, <i>on the reverse</i> , LIBER-	
TAS. RESTITVTA — — — — —	CXII $\frac{1}{2}$
VESPASIANVS, <i>on the reverse</i> ,	
PACI AVGVSTI — — — — —	CXI
* <i>A second, on the reverse</i> , COS. III	
TR. POT.	CXIV $\frac{1}{2}$
<i>A third, on the reverse</i> , PONT,	
MAX. TR. P. COS. VI — — — — —	CXI
* <i>A fourth, on the reverse</i> , PACI,	
AVGVSTI — — — — —	CVIII $\frac{1}{4}$
<i>A fifth, on the reverse</i> , PACI,	
AVGVSTI — — — — —	CX
* T. VESPASIANVS, <i>on the reverse</i> ,	
ANNOA. AVG — — — — —	CIX $\frac{1}{2}$
* DOMITIANVS. COS. II. — — — — —	CXIII
* <i>A second</i> , DOMITIANVS. COS.	
VI. CAESAR. AUG. F. <i>on</i>	
<i>the reverse</i> , IVVENTVTIS.	
PRINCEPS — — — — —	CXII $\frac{1}{2}$

These *aurei* were selected by me, out of several others, as the fairest and intirest; and amongst these to such as I have prefixed an asterisc, they are such as seemed so perfect, that I could make no just objections against them. By these it appears that ¹ *Pliny*, speaking of the gold coins, ² *Plin. l. 33. c. 3.* rightly informs us. *Paulatimq; Principes imminuere pondus, imminuisse vero ad XLVIII.* That by degrees the Emperors lessened the weight [of the *aurei*] to the forty eighth part of the Roman pound; that is, to the fourth part of the ounce. For this

^f Lampridius in
Alex: Severo.

is the lowest weight, that I find; till *Heliogabalus* time, who coined new sorts of *aurei*, different from what had been the constant practice of the Roman State: some of which were the fiftieth part of the *libra Romana*, and others again so massy, that they were *centenarij*, or *bilibres*; which not long after were altered, and abolished, by *Alexander Severus*. The manner is expressed by ^f *Ælius Lampridius*, in the life of *Alex: Severus*. *Formas binarias, ternarias, & quaternarias, & denarias etiam, atque amplius, usque ad bilibres quoque, & centenar, quas Heliogabalus invenerat, resolvi precepit, nec in usu cujusquam versari: atque ex eo his materiæ nomen inditum est, cum diceret plus largiendi hanc esse Imperatori causam, si cum multis solidos minores dare posset, dâns decem vel amplius unâ formâ, triginta, & quinquaginta, & centum dare cogeretur.* Under the same *Alex: Severus* began the *semisses aureorum*, and *tremisses* to be coined, which had not formerly been in use. The *semisses* were answerable in weight to the *denarii Casarei*, when they were least, that is, ninety six in the Roman pound; though *Agricola*, *Villalpandus*, and others, upon a mistake, equall them then to the *drachma Attica*. ^t *Ælius Lampridius* writing of *Alex: Severus*, plainly expresses that in his time they began. *Tumq; primum semisses aureorum formati sunt, tunc etiam, cum ad tertiam partem aurei vestigal decidisset, tremisses, dicente Alexandro etiam quartarios futuros, quod minus non posset.* Afterwards, *Constantine*, *Constantius*, *Julian*, & other succeeding Emperours, lessened the weight of the *aurei*; whereby there came to be seventy two in the

^e Lampridius in
Alex: Severo.

the

the Romane pound, so that each of them weighed the *sextula*, or four *scrupula*. That the *aurei* of *Constantines*' time were sixty two in the Romane pound, is most evident out of the *Codex Theodosianus*, where they are also absolutely called *Solidi*, without the addition of *aurei*.

^u L. SI QVIS. C. THEOD. DE PONDERA-^u *Codex Theo-*
TORIBVS, ET AVRI INLATIONE. Siquis^{dos. l. i. de}
solidos appendere voluerit auri cocti, septem soli-^{ponderatoribus!}
dos quaternorum scripulorum, nostris vultibus fi-
guratos, adpendat pro singulis unciis. XIV. verò pro
duabus, juxta hanc formam omnem summam de-
biti inlaturus: eadem ratione servandâ, etsi ma-
teriam quis inferat, ut solidos dedisse videatur.

* *Pancirollus*, in his *thesaurus variarum lectio-* * *Gui: Panci-*
num utriusque juris, reads *VI. solidos*, instead of *rolli thesaur.*
VII. and XII. instead of XIV. And that it *var. lect. utr.*
must necessarily be so, besides that the *solidi* of *juris.*
Constantine now extant prove as much, may
bee collected out of the proportion of weight,
vvhich is here assigned by *Constantine* himself
to the *solidi*, and that is four scruples, or the
sextula. For the *solidus* containing four scru-
ples, and the ounce containing twenty four
scruples, there will therefore be sixe *solidi* in
the ounce; againe, the pound consisting of
twelve ounces, and the ounce of sixe *solidi*, the
whole pound therefore will consist of seventy
two *solidi*. These *aurei* by *Iustinian* in like manner
are termed *solidi*. L. QVOTIESCVNQVE. C.
DE SVSCEPTORIBVS, PRÆPOSITIS, ET
ARCARIIS. Where he also defines the same
weight. * *Quotiescunque certa summa solidorum*
pro tituli qualitate debetur, & auri massa trans-
mittitur,

* *Cod. lib. 10. tit.*
70. in rescripto
Valentiniani &
Valentis Imp.

* This excellent place very hardly escaped *Haloanders'* commendation, who had a great minde to have played the Critick, and to have altered it. For he thus writes. *In vetusto codice in rasam membranam hæc ita reposita sunt, ut certum sit alteram, & fortasse genuinam lectionem sublatam, & legendum, duodequingquaginta, aut certe quinquaginta.* A goodly consequence, because the parchment was scraped, & the first writing altered, therefore the true reading must be expunged

and a false one put in: whereas he might with more candor, and ingenuity, have concluded the contrary, that the false one was expunged by the scribe, and the true one inserted. For who uses in copying of MSS. to scrape any thing out of the *apographum*, but onely when by collating it he findes it to be different from the Originall? * *Agricola l. 2. de pond. & temperat. monetarum.* * *Zonar. l. 3.* * *Isidorus l. 16. Orig. c. 24.*

*mittitur, * in LXXII. solidos libra feratur accepta.* The same thing is implicitly confirmed by *Isidorus (l. 16. Orig. c. 24.) Solidus alio nomine sextula dicitur, quod iis sex uncia compleatur. Hunc ut diximus, vulgus aureum solidum vocat, cujus tertiam partem ideo dixerunt tremissem, quod solidum faciat ter missus.* Where * *Agricola*, I imagine, truly findes fault with him for calling the *solidus*, *sextula*; though the proportion he assigns is right, that is, that the *solidus* was the sixth part of the Romane ounce, and contained *ἕξα ἡς σαθυόν*, the weight of the *sextula*, as it is attested by * *Zonaras*: or, which is all one, that seventy two *solidi* were made out of a Romane pound, as *Iustinian* before expressly assigned: and as infinite store of the *solidi*, or *aurei*, from *Constantine* to *Focas*, which I have weighed, manifestly prove,

In the same place of * *Isidorus* we may collect the reason, why the *aureus* was called *solidus*. After that, the *semisses*, and *tremisses aurei* were coined, the *aureus* was called *solidus*, because nothing was wanting to it. *Solidum enim Antiqui integrum dicebant, & totum:* In which sense the *solidus* was also taken for the *libra*, or *assis*; that is, as the *assis* is taken for the whole, according to that usuall phrase of Civi-

lians *ex asse* heres, when one is heir to the whole inheritance: so the *solidus* was taken for the whole *assis*.

^b *Volusius Metianus*. *Prima divisio solidi, id est libra quod as vocatur, in duas partes dimidias deducitur*. From hence (saith

^b *Vol. Metianus de assis distrib.*

^c *Salmasius*) the Romanes called that the *solidus aureus*, when it had the same weight in gold, which the *solidus*, that is, the *assis* had in respect of *brasse*, that is, two drachmes. Though I rather suppose that the *aureus* was called *solidus*, first of all in *Severus'* time, not for containing two *denarii* in weight, (which *Salmasius* calls drachmes) for so it alwaies did under the later Consuls, and first Emperours, but because the *aureus* was then first divided into two parts, that is, into the *semisses*, and *tremisses*, and so relatively to these the whole *aureus* was rightly called *solidus*. Of the same opinion is ^d *Agricola*. *Quos aureos, cum respectum ad semisses & tremisses haberent, tunc primò dixerunt solidos, quòd semisses ex dimidiâ eorum parte, tremisses ex tertia constarent*.

^c *Hinc & solidum aureum dixere Romani, ubi idem pondus habere cæpit in auro, quod solidus, id est, as haberet in ære, duarum nempe drachmarum. Salmas. de modo Vsur.*

^d *Agricola l. 2. de pond. & temp. monetariæ.*

The *semisses*, and *tremisses*, of the other Emperours, at some distance after *Severus*, came to be lesse in the same proportion, as the *aurei* were lessened. For the *aurei* of *Severus* were double to the *denarii Casarei*, and therefore but forty eight in the pound, and not fifty as *Helio-gabalus* made, whose errour *Severus* corrected. But when the later Emperours made seventy two *aurei* out of the *Romane* pound, the *semisses* came also to be diminished, and were half of these new *aurei*, and not of the former, and the *tremisses* the third part. And here the *aurei* lost that proportion, which they kept before of being

* I have since perused another *tremissis* in gold, a very fair one, with this inscription D.N. JUSTINUS, P.F. AUG. weighing twenty two grains and better; which formerly belonged to the learned Geographer *Ortelius*. Besides a third, of *Majorianus* with CONOB superscribed (which signifies *Constantinopolitacum obrixum* or *Constantinopoli ob-signatū*) weighing likewise twenty two grains. And a fourth, of *Iustinian*, weighing twenty three.

^b *Covarruvias* tom. 1. c. 3. paragr. 1. & 2. de vet. aureis, & argenteis numis.

ing double to the *denarii*. Of these *tremisses* is *Iustinian* to be understood, L. FORTISS. MILITIBVS. COD. DE MILITARI VESTE *Fortissimis militibus nostris per Illyricum non binos tremisses pro singulis clamydibus, sed singulos solidos dari precipimus*. And this may be farther proved by a fair * *tremissis* in gold of mine own of *Iustinian*, with the inscription D.N. JUSTINIANUS, weighing twenty one grains English, and therefore wanting onely three grains $\frac{1}{5}$, which it may have lost by time: otherwise it would be exactly the 216th part of the Roman pound, that is, the third part of the *aureus*, or *solidus* of those times: whereas if it had been coined to the proportion of the *aureus*, when there were forty eight in the pound, it should have weighed 36 grains $\frac{1}{2}$, so that it must have lost 15 $\frac{1}{2}$, a difference so great, in a peece of gold so fair, and withall of so small a quantity, altogether improbable. And therefore this coin alone, if no more were extant, would confute their opinion, who maintain, that the *tremissis* of *Iustinian* differed not from the *tremissis* of *Severus*, and consequently the *aurei* of them both, better then the reasons produced by ^b *Covarruvias* to the contrary have done.

The weight of some of the fairest Aurei of the
Romane Emperours, from Nerva

to Heraclius.

On the fore part of the Aurei
are these characters.

On the reverse these.

Eng:grains.

IMP. NERVA. CAES. AVG. P.M.

TR. P. II. COS. III. P. P.

IMP. TRAIANVS. AVG. GER.

DAC. P. M. TR. P. COS. VI. P. P.

IMP. CAESAR. TRAIAN. HA-

DRIANVS. AVG.

ANTONINVS. AVG. PIVS. P. P.

TR. P. XII.

ANTONINVS. AVG. ARME-

NIACVS

IMP. CAES. L. AVREL. VERVS

AVG

L. VERVS. AVG. ARM. PARTHI.

MAX

M. COMM. ANT. P. FEL. AVG -

P. P

SEVER. P. AVG. P. M. TR. P. X.

COS. III

IMP. M. ANT. GORDIANVS.

AFR. AVG

* Trebonianus, Gallus

* Gallienus

IMP. PROBVS. P. F. AVG

IMP. C. CARINVS. P. F. AVG

DIOCLETIANVS. P. F. AVG

FIDES. EXERCITVS—

111 $\frac{1}{2}$

DIVVS. PATER. TRAI-

ANI.

110 $\frac{1}{2}$

COS. II. P. M. TR. P.

P. AVG

121 $\frac{1}{2}$

COS. III

119 $\frac{1}{2}$

P. M. TR. P. XVIII. IMP.

II. COS. III. in Scuto

Victoria. VIC. AVG.

118 $\frac{1}{2}$

CONCORDIAE. AV-

GVSTOR

117 $\frac{1}{2}$

TR. P. II. COS. II

TR. P. V. IMP. III. COS.

II

113 $\frac{1}{2}$

IOVI. VLTORI.

114

FELICITAS. SAECVLI-

114 $\frac{1}{2}$

CAESAR M. ANT.

GORDIANVS. AFR.

AUG

114

P. M. TR. P. III. COS. II.

P. P

75 $\frac{3}{4}$

P. M. TR. P. III. COS. P. P.

74 $\frac{1}{2}$

VICTORIOSO. SEM-

PER

105

SPES. AVGG

72 $\frac{1}{2}$

IOVI. CONSERVAT.

AVGG

77 $\frac{1}{2}$

MAY

MAXIMIANVS.	VIRTVS. MILITVM. T.	74
CONSTANTINVS. MAX. AVG	SECVRITAS. REIPVBLI-	
	CAE	70
	<i>infra</i> TR	
CONSTANTINVS. P. F. AVG.	VIRTVS. AVGVSTI. N.	68
CONSTANTIVS	GLORIA. REIPUBLICAE	
	VOT. XXX. MVLTIS.	
	XXXX. <i>infra</i> SNNS.	70
IM. CAE. MAGNENTIVS. AVG	VICTORIA. AVG. LIB.	
	ROMANOR.	70 $\frac{3}{4}$
	<i>infra</i> TR	
FL. CL. IVLIANVS. P. F. AVG	VOT. X. MVLT. XX. <i>infra</i>	
	ANT.	68 $\frac{1}{4}$
D. N. IOVIANVS. P. F. PERP.	SECVRITAS. REIPVB-	
AVG.	LICAE.	68
	VOT. V. MVLT. X. <i>in-</i>	
	<i>fra</i> COS. P	
D. N. VALENS. P. F. AVG	RESTITVTOR. REIP.	
	<i>infra</i> ANTO	68 $\frac{3}{4}$
D. N. VALENTINIANVS. P. F.	RESTITVTOR. REI-	
AVG	PUBLICAE	69 $\frac{3}{4}$
<i>A second</i>		69
D. N. GRATIANVS. P. F. AVG	VICTORIA. AVGG. <i>in-</i>	
	<i>fra</i> TROES.	69
<i>A second</i>		68 $\frac{1}{4}$
D. N. THEODOSIVS P. F. AVG	VICTORIA. AVGG. <i>in-</i>	
	<i>fra</i> CON	68
<i>A second</i>		69 $\frac{1}{4}$
D. N. ARCADIVS. P. F. AVG	NOVA. SPES. REIPVB-	
	LICAE.	67 $\frac{1}{2}$
	<i>intra corollam</i> XX. XXX	
	<i>infra</i> CONOB	68
<i>A second</i>		69 $\frac{1}{2}$
D. N. HONORIVS. P. F. AVG	VICTORIA. AVGGG.	
	<i>statua, cui inscript. R. V</i>	
	<i>infra</i> CONOB	69 $\frac{3}{4}$
<i>A third</i>		68 $\frac{1}{4}$
D. N. HONORIVS. P. F.	VICTORIA. AVGGG.	
AVG	N. D. <i>infra</i> CONOB	
D. N. THEODOSIVS. P. F. AVG	IMP. XXXXII. COS. XVII	
	P. F. <i>infra</i> CONOB.	69 $\frac{1}{2}$
D. N. PLA. VALENTINIANVS	VICTORIA. AVGGG.	
	D. N.	

D.N. VALENTINIANVS. AVG	<i>infra</i> CONOB. ———	68	1
D. N. VALENTINIANVS. P. F. AVG	VICTORIA. AVGGG		
	<i>infra</i> CONOB. ———	69	5
D. N. IVL. NEPOS, P.F. AVG.	VICTORIA. AVGG.		
	<i>infra</i> TROES ———	68	
D.N. ANASTASIVS. P.F. AVG	VICTORIA. AVGGG.		
	A. <i>infra</i> CONOB ———	69	4
D.N. IVSTINIANVS. P.F. AVG	VICTORIA. AVGGG.		
	<i>infra</i> CONOB. ———	68	2
D.N. FOCAS. PERP. AVG	VICTORIA. AVGG.		
	A. <i>infra</i> CONOB ———	69	
D.N. FOCAS. PERP. AVG	VICTORIA. AVG. <i>in-</i>		
	<i>fra</i> CONOB ———	68	
		69	3
...HERACLIVS. ———		69	4
a second ———		69	2

And thus much of the *aurei* under the former, and later Emperours, as they serve to illustrate, and prove the weight of the *denarii Casarei*, which is our next, and principall inquiry.

The *denarii* under the *Casars* were almost as various, and unconstant, as the *aurei*, sometimes more, sometimes lesse; and if they had not been so, they could not have kept that proportion to the *aurei* of the former Emperours, which we assigned. From *Augustus*' time to *Vespasian*, as I finde by examining many of them, they continually almost decreased, till from being the seventh part of the Roman ounce, they came now to be the eighth part: and therefore ninety six were coined out of the Romane *libra*, whereas before under the Consuls eighty four. From *Vespasian* to *Alex: Severus*, as far as I have observed,

ved, the silver continued at a kinde of stay in respect of weight, excepting onely such coins, as upon some extraordinary occasion, both then, and in the first Emperours time, were stamped, either in honour of the Prince, or of the Emperesse, and *Augusta familia*, or else in memory of some eminent action. These last, most usually were equall to the *denarii Consulares*, and many of them had these characters E X. S. C or else S. P. Q. R Under *Severus*, and *Gordianus*, the *denarii* began to recover their primitive weight, and came to be equall to the *denarii Consulares*, the half of which also were exactly the *Quinarii*: and so continued during the succeeding Emperours till *Iustinian*, with little diminution, but most commonly with a notable abasement, and mixture of allay. After *Iustinian*, there happened such a deluge of barbarous Nations, which overflowed the greatest part of *Europe*, that not only the coins, but even the liberall arts, and sciences, began with the majesty of the Empire to decline from their first lustre, and perfection.

Wherefore I shall not speak of the *Μιλιαρίσιον*, or *μιλιαρίσιον*, a sort of silver coin in use, before, and after *Iustinian*, which some collect out of *Cedrenus* to have been the eighth part of the ounce, and therefore equall to the *denarius*, in the lowest valuation; though * *Snidas* renders *μιλιαρίσιον* τὸ τέ νομίσματος δέχματον, and the *Scholastes Basilic. Eclog. 23.* δωδέχματον, and to contain twenty four *φόλλεις*. But I shall not positively determine, either the weight of this, or of the *κερσίπιον*, or *siliqua* in silver, both coined when the Emperiall seat was translated

Cedrenus in histor. compend.
* *Snidas in voce Μιλιαρίσιον.*

to *Byzantium*, unlesse I had examined some of the fairest of them. And for the same reason I shall not define the Hebrew *denarius*; mentioned by *Elias* in *Thisbite*, in the word דִּינָר, & by * *Moses Gerundensis* upon *Exodus*, and by the * *Chaldy Paraphrase*, 2 Reg. 5. 5. which I imagine to have been no other then the Romane *denarius*, used by the Jews: neither shall I determine the Arabian دينار *dinar*; and درهم *derham*: the former of which the Rabbins call דִּינָרָא; used by *Rhasis*, *Avicen*, *Mesue*, and by severall other Arabians; both Physicians, and Historians. All that can certainly be concluded is this; that by the دينار *dinar*; when wee speak of a coin, is meant sometime the *denarius*, and sometime the *aureus*: but when we speak of a weight, alwaies the *aureus* is understood: as by the درهم *derham*; the δρεχμῶν, or silver dram. But surely the quality of the thing is different from the name: the silver drachme of the Arabians, as it is generally now used in the Mahometane dominions in the East; consisting of XLVII. $\frac{1}{4}$. grains English, (as I have found by weighing many of them) which is much lesse then either the *Drachma Attica*, or the *denarius Consularis*: & somewhat lesse then the *Denarius Cesareus*. And yet it is not improbable; but that this may have continued with the, without any diminution; for sixe, or seven hundred years to our times: as well as the Romane pound, and ounce, have continued intire sixteen hundred years, and

I 2

bet-

better. But to omit any farther prosecutiō of the درهم & دينار of the Arabians, which may hereafter more fully be discussed, when we shall handle their measures, and weights, and to goe on with our discourse of the Romane *denarius*. After the breaking in of so many barbarous Nations, as of a torrent, into the Romane Empire, the *denarius* began generally to be disused, every one almost of these, as an argument of their Sovereignty, and conquests, making new coins of their own: or else such as continued the former, either by allaiies so abased the finenesse, and valuation of the coins, or by severall diminutions so impaired the weight, that the *denarius* totally fell, and at last almost vanished into nothing. Neither will this seem strange, if we shall consider that the like alteration, in respect of weight, hath happened, by the revolution of a lesse time, in our own coins. I shall instance in our *denarius*, or penny, which in *Ethelreds* time, that is, a litle more then 150. years since, was the twentieth part of the Troy, or silver ounce: as ^b M. *Lambard* in his Saxon Glossary observes, and as by experience I have found (and the same proportion was anciently observed by the ^c French in their *denier*). This proportion continued successively to *Edw*: the first, in whose time we find the weight of the *denarius* by *Statute to be thus defined. *Per ordinationes totius regni Anglia denarius Anglia, qui vocatur Sterlingus, rotandus, sine tonsurâ, ponderabit 32 grana frumenti in medio spicâ, & 20 denarii faciunt uncia, & 12 uncia faciunt libram.* Under ^d *Edward* the third it came

^b *Lambardi Glossarium Cantabrig:*

1644.

^c *In appendice libri de limit. agrorum: Iuxta Gallos vigesima pars uncia denarius est, & 12 denarii solidum reddunt.*

* Stat. 31. E. 1. 1.

^d Stat. 9. Ed 3.

first to be diminished to the twenty sixth part of the Troy ounce : and under ^c Henry the sixth it fell to be the two and thirtieth. In ^e Edward the fourth time it came to be the fortieth. Under ^g Henry the eighth at first it was the fortieth, then the forty fifth. Afterward sixty pence were coined out of the ounce in the second year of ^h Queen Elizabeth ; and during her reign sixty two : which proportion is observed in these times. So that it is evident that *Ethelreds* penny was bigger then three of ours. And after times may see this of ours, as well as the *Romane Denarius*, to be quite diminished , and brought to nothing. For if either our own exigencies, or the exigencies of forain States, with whom we have commerce, cause us, or them (as occasions will never be wanting) to alter the proportions of the gold , and silver coins, either in respect of weight, or in respect of purity , or lastly, in respect of the valuation, the gold bears to silver; by all , or some of these causes, there will inevitably happen such a diminution of the penny (and proportionably of our other coins) that at length it will not be worth the coining. But I leave this speculation to such, whom it doth more neerly concern. And certainly it is a consideration not of the least importance ; money being as the sinews, and strength of a State, so the life, and soul of commerce : and if those advantages, which one Country may make upon another, in the mystery of exchanges, and valuation of coins, be not thoroughly discovered, and prevented , by such as sit at the helm of the State : it may fare with them after much commerce,

* In the same manner the *solidus*, or *au-reus*, as it lost its valuation, so suffered an alteration in the Greek name. For instead of χρυσός. we finde the Glosses to render it χρυσίος. *Glossæ.* χρυσίος *solidus*: and in the same Glosses we read δινέσιος interpreted *Biniones*, and δινέσιον *sestertium*, and δινέσιον λευκόν *asprum*.

ⁱ *Meurſii Glossarium Græco-Barbar: in voce δινάσιον.*

^k *Scalig. de re numm.*

merce, as with some bodies after much food, that instead of growing full, and fat, they may pine away, & fall into an irrecoverable consumption. But I return to the Romane *denarius*, which vve have brought so low, that there is nothing now left of it, but only the name: and that also suffered an * alteration. For the later Greeks instead of the δινάσιον called it the δινέσιον: and both Greeks, and Latines, and sometimes the Arabians, took it not in the same sense, as it passed for in the first institution, that is, for a silver coin, worth in valuation ten, or sixteen *asses*, but for any sort of coin whatsoever. And therefore ⁱ *Meurſius*' observation, in his *Glossarium Græco-Barbarum*, is worth our consideration. *Postea δινέσιον dixerunt ævo corruptiore, & generaliter pro quâvis pecuniâ. Sicut Itali denaro. Galli Denier, Hispani Dinero. Anonymus de bello sacro.*

Δωδεκα ἔχετε πολλὰ, δῶτε τῷ ταβερνάρῃ,
Ἐπάρετε πολὺν κρασί καὶ πίνετε μετ' αὐτός.

Whence the learned ^k *Jos. Scaliger* rightly observes, that, *ultimis temporibus denarii pro exigua stipe usurpati sunt, ut hodie in Gallia. Imperator Aurelianus: Philippeos minutulos quinquagenos, aris denarios centum. Eos Vopiscus in Bonaso. sestertius aris vocat. Macrobius de nummo ratito loquens, qui erat æreus: Ita fuisse lignatum hodieque intelligitur in alex lusu, cum pueri denarios in sublime jactantes, capita, aut navia lusu teste venustatis exclamant. In Evangelio secundum Marcum 12. λεπτὰ δύο ὃ ἐστὶ κοδέντης. Hilarius duos denarios vidua inopis Deo acceptiores. Luc.*

10. ἐμβαλὼν αὐτὸ ἀνδρεία, *Ambrosius*, duo era: *Vetustissimus est igitur denarii usus ἀντὶ τοῦ χαλκισμῶς, vel stipe.* Thus far *Scaliger*.

Such an uncertainty being then, as we have mentioned, both of the *aurei*, and *denarii*, under the first *Cæsars*, in whose times the purest coins, and the best wits most flourished, and such an abasement, and impureness of the silver under the later Emperours, no reasonable man can imagine, that either the ancient Grammarians, Poets, Oratours, Historians, or especially Physicians, whom it did most concern to be precise, and most of which lived under the former Emperours, did ever allude to the weight of the *denarius Cæsareus*, but rather to the *Confularis*. And to this onely, and to no other, did the Attick drachme mentioned by *Dioscorides*, *Cleopatra*, *Galen*, *Julius Pollux*, *Oribasius*, and the rest of the Greek Authors correspond. And thus have we finished our discourse concerning the *denarius*, in the notion, and acception of the Ancients, both Greeks, and Latines.

Our next labour should be to compare it with the standards for weights of divers Nations, used in these times. For which I had recourse to the publick *Zygostata*, and *Ponderatores*, in my travels abroad: and for my observations I must refer the Reader to this ensuing Table.

* These weights (excepting the *rotulo* of *Damascus*) were diligently compared with the Originals, and Standards: in like manner as I examined the measures above described. In both which if any shall finde some litle difference, from some Originals, as five, or six grains in the English pound, & it may be one, or two parts of a thousand in the English foot, different from the Standards in the *Exchequer*, or the *Tower*, or at *Winchester*, or some other place, it is not much to be wondred. For I have found as great differences in collating the English Standards themselves: and have heard *Gassaro Berti* (one of the exactest men in this kind that I have known) to complain of the same diversity at *Rome*. And though it bee a shame that in any well governed Kingdome, or Common-wealth, the Standards, which are the rules of commutative justice, should

*A Table of the gold, and silver * Weights of severall Nations, taken from their Standards, and compared with the Denarius.*

Eng: grains.

Such parts, or grains, of the English Standard for gold, and silver (or of the Troy weight) as the <i>denarius Consularis</i> containeth 62, according to the weight of the best coins, or according to the weight of the <i>Congius</i> of <i>Vespasian</i> —	62 $\frac{1}{2}$
The ancient, and modern Romane ounce containeth—	438
The ancient, and modern Romane pound, consisting of twelve ounces, containeth—	5256
The Troy pound, or English Standard of gold & silver; consisting of twelve ounces, containeth—	5760
The Troy, or English ounce, (to which five shillings two pence of our mony in these times are equall) containeth—	480
The Paris pound, or Standard for gold and silver, of xvi ounces—	7560
The Paris ounce—	472 $\frac{1}{2}$
The Spanish pound, or Standard for gold and silver, of sixteen ounces, taken by me at <i>Gibraltar</i> —	7090
Another weighed by me at <i>Gibraltar</i> —	7085
	The

The Spanish pound in Villalpandus, is (I know not by what error) but--	7035
The Spanish ounce at Gibraltar (the pound consisting of 7090. grai. English)-----	443 $\frac{1}{2}$
The Venetian pound, or Standard for gold and silver, of XII. oun.--	5528
The Venetian ounce-----	460 $\frac{2}{3}$
The Neapolitane pound, or Stan- dard for gold & silver, of twelve ounces-----	4950
The Neapolitane ounce-----	412 $\frac{1}{2}$
The pound, or Standard for gold and silver, of twelve ounces, at Florence, Pisa, and Ligorn-----	5286
The ounce at Florence, Pisa, and Ligorn-----	440 $\frac{1}{2}$
The pound, or standard, at Siena, for gold & silver of twelve oun.--	5178
The ounce at Siena-----	431 $\frac{1}{2}$
The ounce at Genoa, for gold and silver-----	405 $\frac{1}{2}$
The Turkish Okeh, or Oke, at Con- stantinople, consisting of four hundred silver drams-----	19128
The silver dram generally used in the great Turks' dominions: as also in Persia, and in the Moguls' Countries, if I be not misinformed	47 $\frac{4}{5}$
The Turkish sultani, or Egyptian sherif, being a gold coin, with w ^{ch} the Barbary & Venetian <i>chequeen</i> , and Norimberg ducat, within a grain more, or lesse, agree-----	53 $\frac{1}{2}$ The

be unequal, & there-
fore unjust; yet unlesse
more art, and circum-
spection be used, then
hitherto hath been put
in practise, it is im-
possible but such ine-
qualities will creep in.

But this observati-
on of mine by some
may be thought too
nice, and curious. That
which follows, I am
certain, is as necessary,
as the preservation of
the life of many a
man. And that is, that
some Physitians erro-
neously imagine the
granum auri to be a-
like in all Nations.
And therefore *Ferne-
lius*, a very able man
(who, I think, was the
first Authour of that
opinion) writes thus.
(*Fern l. 4. c. 6. Method.
Medendi*) *Granum, cui
tandem basi reliqua
inmittuntur pondera,
ratur constansque esse
debet; neque id granum
esse bordci, neque triti-
ci, neque ciceris, neque
frugis ullius, aut legu-
minis, quod nullius
par sit ubique gentium
pondus. At vero num-
marium minutum, quod
aurisabri granum ap-
pellant, & Latine mo-
mentum dici potest,*

omnibus mundi nationibus unum idemque est, & stabile, quod auri sacra fames, & opum fariosa libido, inviolatè & incorruptè servat, idque signis & exemplaribus undique identidem collatis. Indeed it was an usefull fancy of his to think of some common mea-

The *Ratel*, or *Rotulo*, for gold and silver of 174. drams, at Cairo—

6886 $\frac{1}{25}$

The *Ratel*, or *Rotulo*, for silk of 720 drams, at Damascus (with which I suppose they there formerly weighed their gold and silver; because most Countries use the same weights for silks, gold, and silver) —————

34430 $\frac{2}{5}$

sure, in which all Nations might concur: though it is more to be wished for, the ever to be expected: But that asseveratiō of his, *inviolatè, & incorruptè servat, idq; signis & exemplaribus undiq; identidè collatis*, from a man of such rare abilities, I cannot but extremely wonder at. For if we shall goe no farther to confute his assertion, then to compare our *grana auri* with those of *Paris*, which *Fernelius* used, we shall find ours much bigger: XXXIX. English grains almost equalling XXXVI. of *Paris*. Or if we shall compare the *Spanish grana auri*; with his, we shall finde those much lesse: XXXVI. Spanish grains weighing but XXVIII. $\frac{1}{2}$. of his at *Paris*. The like could I demonstrate in those of other Countries. By which dangerous, and notable errour, for want either of due care, or an exact balance, we may conceive that whatsoever also is delivered by the Ancients, in the like nature, is not presently without due examination to be credited.

In this Table I judged it much fitter to compare the *denarius*, with the Standards for gold, and silver of severall Nations, then with their gold and silver coins, now current. Because the pōnds, and ounces of the Standard, continue alway the same; whereas the gold, and silver coins, being cut in severall proportions, according to the exigencies of the State, admit of severall alterations, and diminutions.

The CONCLUSION.

IT was my intention from the *Pes Rom.* and *denarius*, together with the *Congius of Vespasian*, to have deduced the other weights, and measures, used by the Romanes; and from those of the Romanes, by such testimonies, as are upon record in the writings of the Ancients, to have inferred those of the *Hebrews*, *Babylonians*, *Egyptians*, *Grecians*, and of other Nations. A work I confesse intricate, and full of difficulties: wherein I could expect neither to give my self, nor others satisfaction, without first laying some sure, and solid principles for the *basis*, and foundation. Therefore that occasioned me to insist the more largely in the prosecution of the *pes Rom.* and *denarius*, and to examine all the waies, I could possibly imagine, for the evident proof, and confirmation of them. What in this kind I have done, and with how much truth, and diligence, I leave to the impartiall test of after times, the rest at more leisure may be perfected. Yet these following observations, as a *coronis* to the whole work, I thought would not be unacceptable, if by way of anticipation I communicated them to the world: and those are how the Originals, and Standards, of weights, and measures, notwithstanding the revolutions, and vicissitudes of Empires, may be perpetuated to posterity. Amongst

mongst severall waies, which I have thought of, I know none more certain, and unquestionable, then to compare them with some remarkable, and lasting monuments, in remote Countries, that have stood unimpaired for many hundred years, and are like to continue as many more. In which kinde I made choice of the first, and most easterly of the three great Pyramids in Egypt; of the basis of that admirable Corinthian pillar, erected (as I suppose) by one of the Ptolemies, a quarter of a mile distant to the South from Alexandria, being one vast, and entire marble stone: Of the rock at Tarracina, or Anxur, where it adjoins to the *via Appia*, and almost touches the *Tyrrhene* sea: Of the gate, or entrance into the Pantheon, or Temple of *Agrippa*, dedicated by him to all the gods, and by the Christians to all Saints. Of the *Porta San-Pa*, in that new, and exquisite structure of *Saint Peters Church in Rome*. If the like had been attempted by some of the ancient Mathematicians, our times would have been freed from much uncertainty, in discovering the weights, and measures of the Greeks, and Latines.

The first, and most Easterly of the three great Pyramids in *Ægypt*, hath on the North side a square descent, when you are entred a litle past the mouth of it, there is a joint, or line, made by the meeting of two smooth, and polished stones over your head, which are parallel

1el to those under your feet, the breadth at that joint, or line, is 3 feet and $\frac{46}{100}$ of the English foot.

Within the Pyramid, and about the midst of it, there is a fair room, or chamber, the top of which is flat, and covered with 9 massy stones: in it, there stands a hollow tombe of one entire marble stone: the length of the South side of this room at the joint, or line, where the first, and second rowes of stone meet, is 34 feet $\frac{11}{100}$.

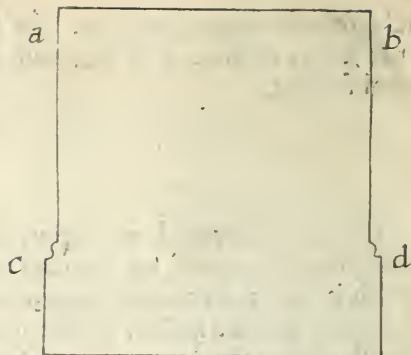
The breadth of the west side of the same room at the joint, or line, where the first, and second row of stones meet, is 17 feet $\frac{120}{100}$.

The hollow, or inner part, of the marble tomb neer the top, on the west side of it, is in length 6 feet $\frac{48}{100}$.

The hollow, or inner part, of the marble tomb, neer the top of it, on the north side, is in breadth 2 feet $\frac{21}{100}$.

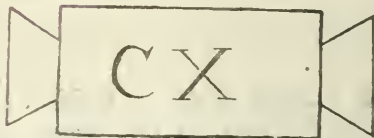
The

The *basis* of the vast *Corinthian* pillar, about a quarter of a mile from *Alexandria* to the South, on the West side of the pillar at *a b*, is in breadth 12 feet $\frac{53}{160}$



at *c d* it is 14 feet $\frac{41}{100}$

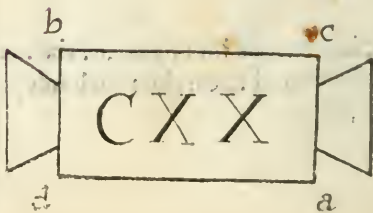
The rock at *Tarracina*, or *Anxur*, neer the *via Appia*, close by the *Tyrrhene* sea; hath these figures, besides severall others in the same perpendicular, very deeply ingraven.



The uppermost line *b c*, over the figures *CXX*, in the innermost, and deepest part of the ingraven, is in length 4 English feet, and

$\frac{702}{1600}$

The lowermost line *d a*, in the innermost, and deepest part of the ingraven, is in length 4 feet $\frac{692}{1600}$



The

The stately gate, or entrance, into the Pantheon, or Temple built by *Agrippa* in *Rome*, the jambes, and top, and bottome of it, being all of one intire marble stone, is in breadth between the jambes, or sides, some three inches above the bottome, and some nine inches within, nineteen feet $\frac{6 \cdot 0 \cdot 2}{1000}$

The *Porta sancta*, on the right hand of the frontispice of Saint *Peters* Church in *Rome*, is in breadth on the pavement, or threshold, between the jambes, or sides of the entrance, eleven feet $\frac{92 \cdot 8}{1000}$

The great gate, or entrance, which is the middlemost of the five in the frontispice of Saint *Peters* Church in *Rome*, the doors of which are covered with leaves of brasle, with very fair and exquisite figures, is in breadth on the pavement, or threshold, between the jambes, or sides of it, eleven feet $\frac{94 \cdot 8}{1000}$

The measures being fixed, we may likewise fixe the weights in this manner; by making a vessell of a cubicall figure, answerable to the proportion of any one of these feet, or palms, or braces, which are described in the Table at the end of the first Treatise. This cubicall vessell being filled with cleer fountain water, we are to weigh it with an exact balance, and to expresse, the weight of it by some one of those weights, which we have placed in a Table at the end of the second Treatise. The side of this cube being known, and the weight of it in water defined, the rest of the weights in the second Table, by way of consequence by those proportions, which we have assigned, may be discovered:

red. Thus for example: the Romane foot described by *Villalpandus* is nine hundred eighty sixe parts, such as the English foot contains a thousand: this being cubed (saith he) weighs of fountain water eighty Romane pounds. If therefore there be given nine hundred eighty sixe parts of a thousand of the English foot, the cube of this will give us eighty Romane pounds in fountain water: and consequently the other weights will be discovered by those proportions, we have assigned to them, in respect of the Romane pound. Again, eighty Romane pounds of water being given, if we reduce this into a cubicall body, the side of it will give the Romane foot described by *Villalpandus*: and consequently the other measures may be deduced, by those proportions we have given them in a peculiar Table. Whereby it appears, that as *by measures* weights may be preserved, so on the contrary *by weights* measures may be restored.



Some directions to be observed in
comparing the valuations of
coins.

IN comparing the valuations, either of ancient coins with modern, or of modern one with another, we are to consider : first, the *intrinseck* of them, and then the *extrinseck*. The *intrinseck* is either the *finenesse* of the coin in respect of metall, or the *gravity* in respect of weight. The *extrinseck* I term first, the *character* imprinted on the coin: and secondly, the *valuation* enjoined by the Prince, or State: by which character, and valuation, what *originally*, and *materially*, was but common metall, or plate, comes now *legally*, and *formally*, to be current mony. With these limitations, if we shall compare ancient coins with modern, and modern one with another, it will be no difficult matter to proportion out their severall respective valuations; and withall to reconcile the seeming repugnancies, either of ancient coins, now found, differing from the traditions of ancient Authors: or the traditions of ancient Authors differing amongst themselves.

I shall first give an instance of modern coins compared with modern, in our English mony compared with that of *Spain*, as being most fa-
K
miliar

miliar to us : the application of which will by analogy serve for all other distinct States, and times, using distinct coins.

In comparing therefore *English money with Spanish money in England*, or *Spanish money with English in Spain*, we are thus to proceed: First, we are to examine whither they be of a like fineness, for the *intrinseck* ; if they be, then an ounce of *English money*, and an ounce of *Spanish* (supposing the weight of the ounce to be alike) will bee of like value in any other Country out of *England*, and *Spain* ; where neither are currant, but onely considered as so much metal, or plate. Secondly, we are to consider the *extrinseck*, that is, the form, and stamp of the coin, with the valuation of it by the injunction of the Prince of either State; and here that which before was *equall*, comes now to be *unequall*. For an ounce of *English money in England* comes to be more worth, then an ounce of *Spanish money in England*: because this wants the character, stamp, and valuation of our Princes, whereby it is currant: and for the same reason will an ounce of *English money* be lesse in valuation, then an ounce of *Spanish money in Spain*, supposing (as I said) the ounce in both Countries to be exactly one and the same.

The same analogy will be, if we compare ancient coins, as those of the *Hebrews*, *Greeks*, and *Romans*, with our *modern coins*. We are first, to consider the *intrinseck* of them, whither they be of a like weight, and fineness for the metall, with ours: and this is the *naturall*, or
physicall

physicall consideration. From whence we may conclude, that if, for example, so many *Attick tetradrachmes* doe equall in purenesse, and weight, so many of our *English* shillings, newly brought from the mint, or so many of our *Troy*, or *silver ounces*, taken from the Standard, then are they to be balanced with these in the acception of them as plate; and a silver-smith, abstracting from the *extrinseck*, that were to melt them both, would give a like value for them both. But if we secondly, look upon them with the image, and character of the State, and in the notion of mony, which is *the politick consideration*, then that which before in the *trutinâ*, and scale, was equall, in the *foro*, and in commerce, comes to be unequal: and an ounce of *English* mony shall passe for more, then an ounce in *Attick tetradrachmes*, with reference to the expenses of the mint, and to the civill valuation, depending upon a mandate, or law, inacted by the Prince.

In like manner will it be, if we compare ancient coins with ancient, made in different States, as it is in comparing ancient with modern.

Upon these grounds of reason it will follow, that whereas the *Romane* Authours make the *denarius Consularis* to be equall to the *drachma Attica*, and the *Greeks* equall the *drachma Attica* to the *denarius Consularis*, that both say true; and yet both of them, if we speak strictly, and exactly, may be deceived. For the *denarius Consularis* examined by the balance, which is the best judge of the *intrinseck*, (I speak of the

intrinseck in respect of weight, and not of the *intrinseck* in respect of finenesse, that being best discovered by the *scale*, and this by the *test*: which last for the more cleernesse of my discourse, I suppose in all these coins to be alike). I say the *Denarius Consularis* is found by me, contrary to the opinion of all modern vvriters, to be lighter, then the *drachma Attica*: and therefore, to speak strictly, and precisely, cannot be equall to it in the *intrinseck*. But again, if we look upon the *extrinseck* of the *drachma Attica*, and *denarius Consularis*, that having the stamp of *Athens*, and this of *Rome*, here reason must be our balance, and not the *trutina*. For the Athenian coin being a forainer, and not currant in *Italy*, in the way of exchange, and commerce, will loose of its primitive valuation it had at *Athens*, and for want of the *extrinseck* of the *Romane* stamp, necessarily rebate in the *intrinseck*. And therefore both Greeks, and Romanes, vvriting in *Italy*, might truly say, that the *denarius Consularis*, and *drachma Attica*, were equall, that is, speaking in *civill commerce*, and *popular estimation*: although they were unequall in the *intrinseck*, and *naturall valuation*.

But if we shall change the scene, and carry the *denarius Consularis* to *Athens*, the case will quite be altered. For the *denarius* being a stranger, and the *drachma Attica* a denizon, that cannot have the same priviledges with this. And therefore the *extrinseck* of the *denarius* being there of no use, and the *intrinseck* in respect of weight falling short of the *drachma*, it must necessarily

cessarily be much lesse in valuation at *Athens*, then the *drachma*: and I think no advised *Athenian*, writing in *Attica*, would make them equall, I am certain no *nummularius* would.

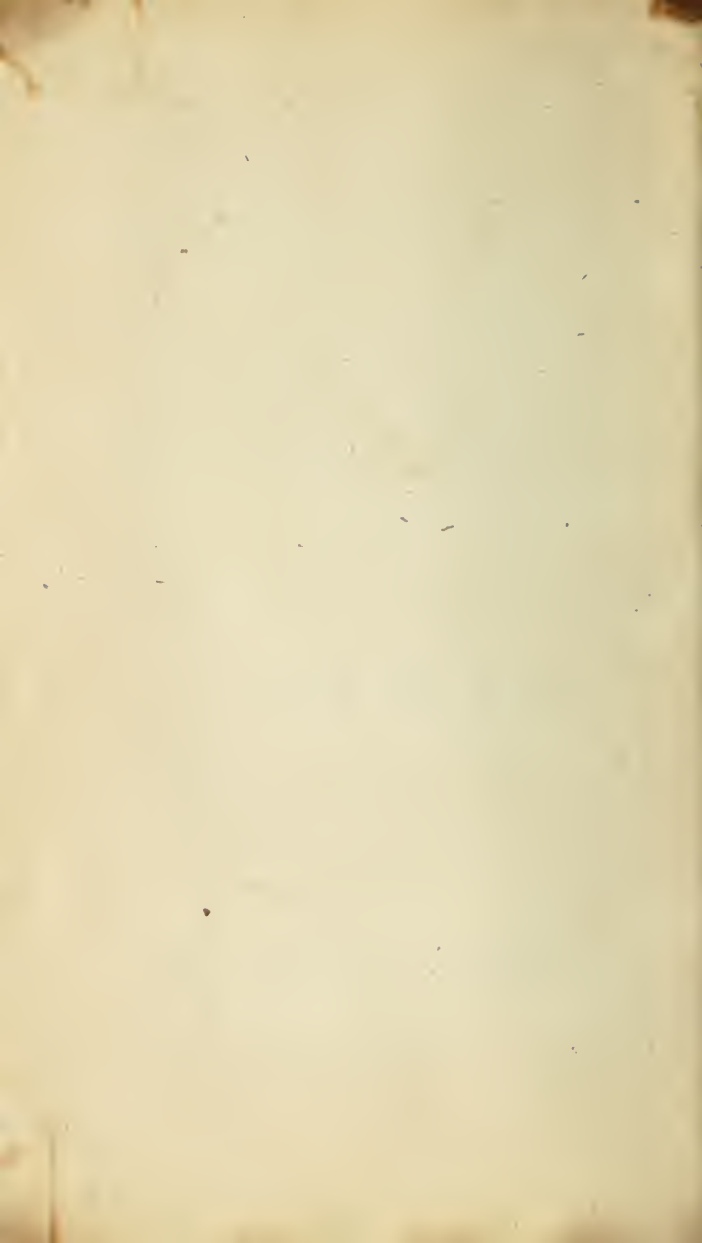
The same may be said of the *Hebrew shekel*, and *Attick tetradrachme*, and of all other coins, of distinct States, mentioned in classical Authors. Thus *Philo*, and *Josephus*, in *Judaea*, both truly equall the *shekel* to the *Attick tetradrachme*, that is, in way of commerce; though the *shekel* be unequall, and lesse then the *tetradrachme* (as I have found by examining many of them) in a just notion of weight. The reason is evident by vvhat hath been expressed before. For in *Judaea* the *extrinseck* makes amends, for what the *shekel* wants in the *intrinseck*; and on the contrary, what the *tetradrachme* exceeds in the *intrinseck*, is diminished for want of the *extrinseck*, till at length in a popular estimation they come to be equall. But the quite contrary would happen, in the transportation of shekels from *Jerusalem* to *Athens*. Here the *shekel* would necessarily fall from its primitive valuation, and the *tetradrachme*, being considered now no longer as a forainer, would recover what it lost in *Judaea*, and consequently rise above the *Hebrew shekel*: as having a double advantage in the *extrinseck*, from the State, and in the *intrinseck* from its weight.

But what need we to goe so far for examples, when as we instanced before, wee have them neerer home? The *Spanish* quarters of the dollar, or *double rials*, passe ordinarily in our

Sea towns but for *shillings*, (whereas they are worth in the *intrinseck* thirteen pence farthing) and our *shillings* passe in *Spain* scarce for a *riall* and an half. For theirs wanting in *England* our *extrinseck*, and ours in *Spain* wanting their *extrinseck*, must respectively rise, and fall in their valuation.

F I N I S.





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